2005

Field Surveys of Aquatic Plants of Northeastern Pennsylvania, Implementation of Quantitative Monitoring Techniques and PNHP Review Assistance

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Final Report Grant Agreement WRCF 22-04/4100021103

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Field reports have been submitted to the Pennsylvania Natural Heritage Program for the 27 (23 aquatic and 4 other) occurrences of PNHP-listed species that we documented. Three hundred and seventy-eight herbarium specimens were collected and deposited in the herbarium of the Morris Arboretum of the University of Pennsylvania and the Academy of Natural Sciences of Philadelphia.

We presented three formal programs on lake ecology and aquatic plant identification to foster an appreciation of the diversity and ecological importance of aquatic plants. We also met informally with lake residents at many of the lakes we surveyed.

We conducted additional field surveys in Erie, Bucks, Carbon, Montgomery, and Northampton Counties resulting in 4 additional records of listed species. A visit was made to Little Tinicum Island to assess the impact of the oil spill in the Delaware River.

One day was spent participating in the Coho site bioblitz.

Disciplines
Botany

Comments
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Philadelphia, PA 19118
215 247 5777 ext. 134

March 24, 2005

Abstract

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Objectives

1. Continue the survey of aquatic plants of lakes in northeastern Pennsylvania initiated in 2000.

2. Provide recommendations for appropriate PNDI status of the plants involved.

3. Provide information to lake community residents and lake managers regarding the diversity and ecological role of aquatic plants.

4. Participate in environmental assessments as needed.

5. Participate in the Coho Site bioblitz.

Justification

Many lakes in northeastern Pennsylvania have not been surveyed for vascular plants recently or at all (Pennsylvania Flora Database, PNHP database). Furthermore, many publicly owned lakes were not included in earlier surveys because it was thought that they did not need protection and therefore were a lower priority for inventorying. Consequently data are not available to accurately assess the true status of many aquatic vascular plants. In addition, several invasive, non-native aquatic plants have been spreading throughout the region and their impact on native lake flora has not been fully evaluated.

Adding to the problem, lake residents and lake managers have little appreciation for the role of aquatic plants in lake ecosystems and little knowledge of the diversity of aquatic vegetation, which is frequently referred to as "seaweed". Demands are frequently made to control aquatic vegetation in privately and publicly owned water bodies to facilitate various recreational and aesthetic uses. The assumption has often been made, in the absence of any inventory data, that the offending vegetation is non-native invasive species such as Eurasian water milfoil.

Materials and Methods

Lake surveys were carried out during June 30 and October 13, 2004 at a total of 13 sites. A rowboat was used to make a circuit of each lake for the purpose of observing and sampling the aquatic flora. At 10 lakes a GPS receiver was used to define sampling sites located about 20 m apart in the littoral zone following a method described by Grund (undated) for western Pennsylvania lakes. All plant species within a 3 m radius were sampled using a grappling tool constructed from 2 garden rakes bolted together back to back that was dragged across the lake bottom. Samples were identified immediately or later in the laboratory, and herbarium specimens prepared for each species found at each lake. A depth gauge was used to record water depth at each sampling point.

Products Delivered

1. A progress report and this final report were submitted to the Wild Resources Conservation Program on November 30, 2004 and March 24, 2005 respectively.
2. Field reports have been submitted to the Pennsylvania Natural Heritage Program the 27 occurrences of PNDI-listed species that were documented.
3. Three hundred and seventy-eight (378) herbarium specimens are being processed for deposition in the Morris Arboretum Herbarium (MOAR) permanently documenting findings (see Appendix A for a list).
4. Recommendations for changes in the status of several species are being evaluated for submission to the Rare Plant Forum and the Vascular Plants Technical Committee.
5. A report on the impact of the oil spill on the freshwater tidal marsh at Little Tinicum Island was submitted to the Bureau of Forestry.
6. A list of 168 plants was submitted as part of the Coho site bioblitz.

Results and Conclusions

Aquatic Plant Surveys

Thirteen lakes or ponds were surveyed for aquatic vascular plants between June 30, 2004 and October 13, 2004.

*Eagles Mere Lake, Sullivan County
*Lake Catalpa, Luzerne County
Lake Lacawac, Wayne County
*Lake Minisink, Pike County
*Lake of Meadows, Susquehanna and Bradford Counties
*Lake Paupack, Pike County
*Log Tavern Pond, Pike County
*Marcel Lake, Pike County
*Mud Pond in Stage Game Lands 91, Luzerne County
*Silver Lake, Susquehanna County
*Spruce Lake, Wayne County
Unnamed impoundment 3.9 km east of Ochre Mill, Luzerne County
Unnamed pond 1.6 km southwest of Tannery, Luzerne County

* sites at which intensive GPS-based surveys were conducted

Twenty-three occurrences of PNHP-listed vascular plant species were documented during our 2004 work on aquatic plants. Field forms have been submitted to the Pennsylvania Natural Heritage Program. Species for which data were collected included: *Andromeda polifolia, Bidens discoidea, Carex lasiocarpa, Cladium mariscoides, Eleocharis robbinsii, Juncus militaris, Lobelia dortmanna, Myriophyllum tenellum, Nymphoides cordata, Schoenoplectus subterminalis, Sparganium angustifolium, Utricularia cornuta, Utricularia inflata,* and *Utricularia intermedia.*

We found two large populations of inflated bladderwort (*Utricularia inflata*), in artificial ponds in Luzerne County. Considered in the context of previously documented

information about the occurrence of this species, these additional data lead us to conclude that inflated bladderwort does not need to be listed by PNHP. We will make this recommendation at a future meeting of the Rare Plant Forum.

We are also evaluating the status of water bulrush (*Schoenoplectus subterminalis* – N/PT), as we documented several large populations in addition to those that were already known.

Data entry of the 378 herbarium specimens that were collected is completed and mounting of specimens is underway. Specimens will be deposited at the Morris Arboretum Herbarium; selected duplicates have been donated to the Herbarium of the Academy of Natural Sciences of Philadelphia.

Detailed Lake Surveys

Data from the 10 lakes at which detailed, GPS-based surveys were conducted follows. Only true aquatic species were mapped, although species lists for most sites contain bog and shoreline species also.

Eagles Mere Lake

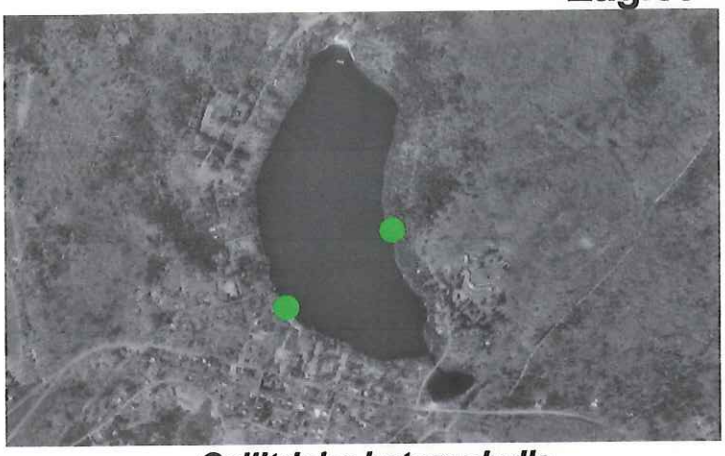
Eagles Mere, PA 17731
Sullivan County, Pennsylvania
Ownership: Eagles Mere lake association
Contact: Bill Feese, Eagles Mere Lake and Watershed Committee

Latitude: 41.41660 deg. N
Longitude: 76.58017 deg. W
Quad: Eagles Mere
Surface area: 118 acres
Maximum depth:
Elevation: 1,994 feet above mean sea level
Natural glacial lake

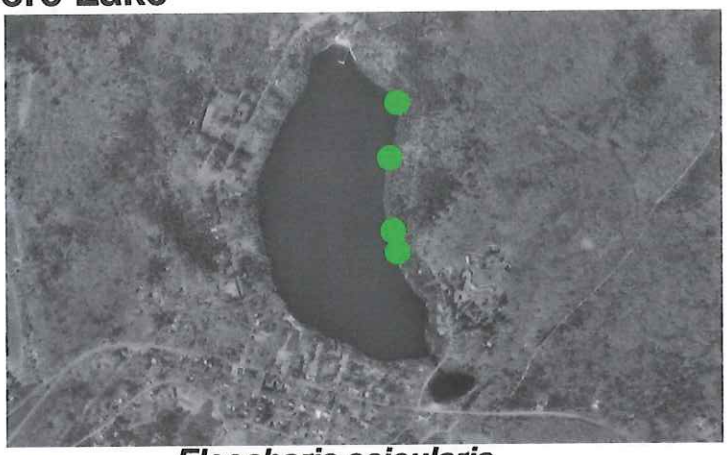
Date visited: August 2, 2004
Number of sampling points: 39
Number of aquatic macrophytes plants recorded: 16, number mapped: 13
PNHP-listed species present: *Myriophyllum tenellum*

Comments:
The water in this lake is exceptionally clear, the bottom is completely visible at depths of 7—8 feet or more. While the main lake is nearly free of floating-leaf plants, the small pond at the outlet is nearly covered with pink-flowered water-lilies.

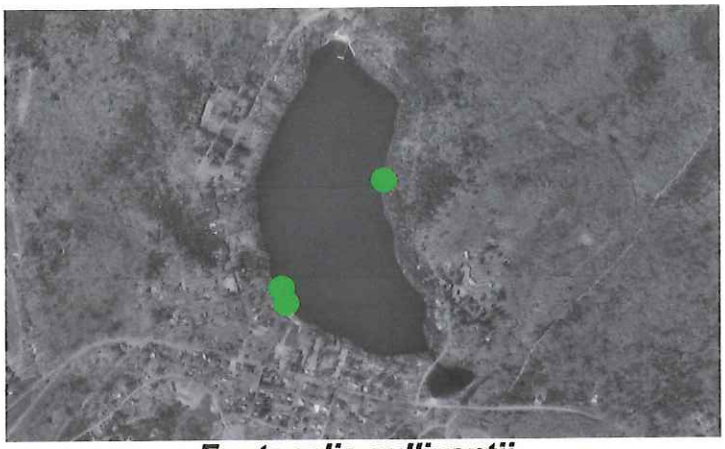
Eagles Mere Lake



Callitriche heterophylla



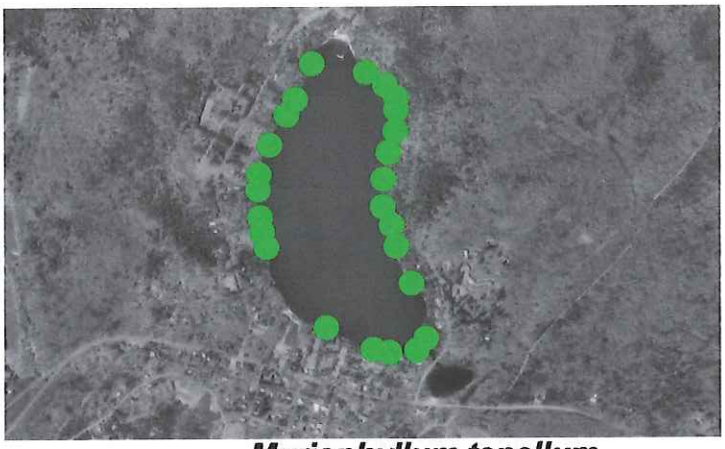
Eleocharis acicularis



Fontanalis sullivantii

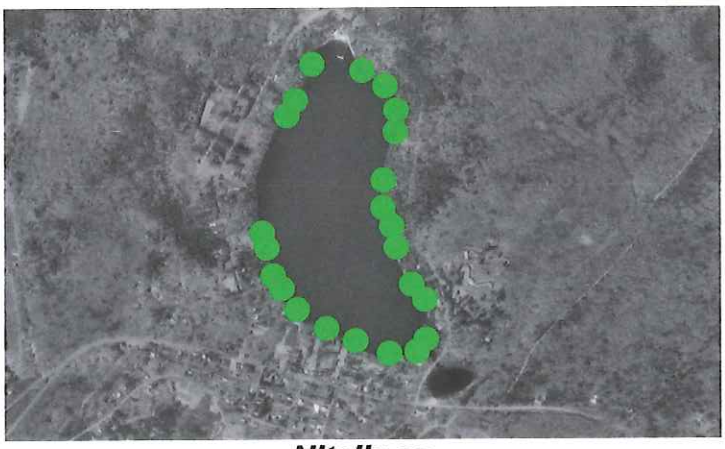
Isoetes sp.

Myriophyllum humile



Myriophyllum tenellum

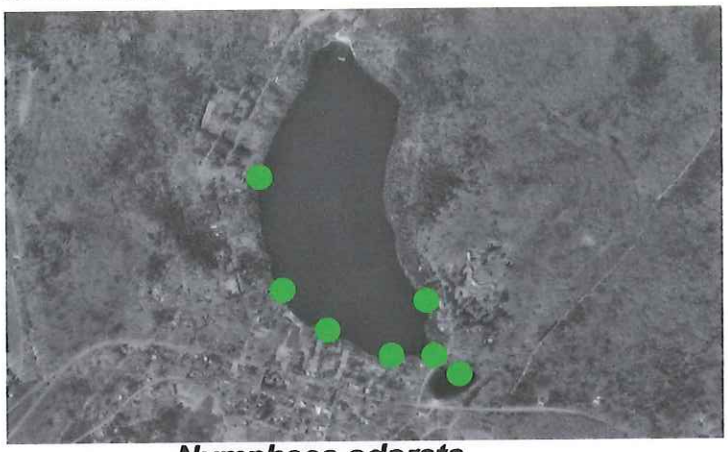
Najas flexilis



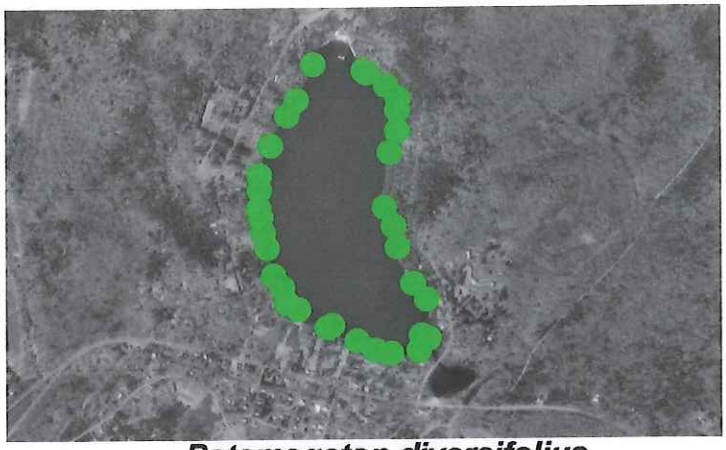
Nitella sp.

Eagles Mere Lake

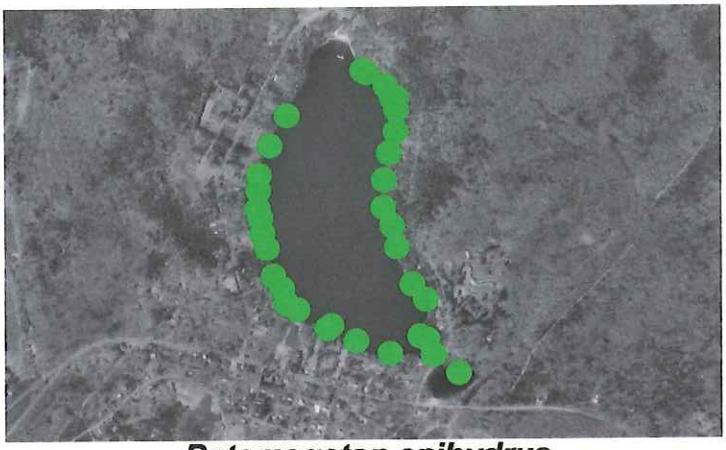
Nuphar variegata



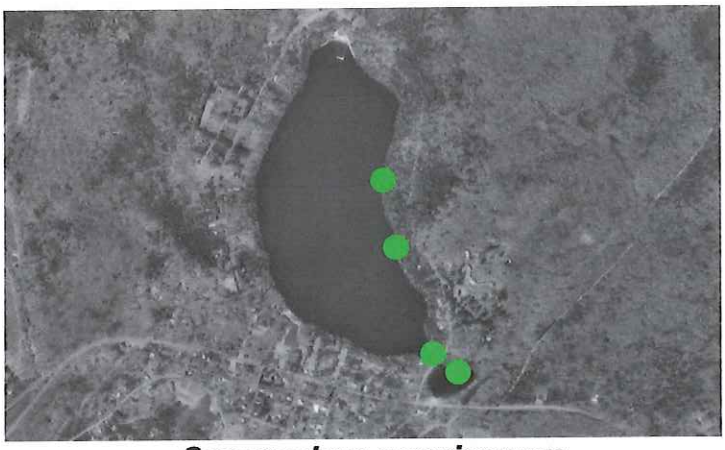
Nymphaea odorata



Potamogeton diversifolius



Potamogeton epihydrus



Sparganium americanum

Lake Catalpa

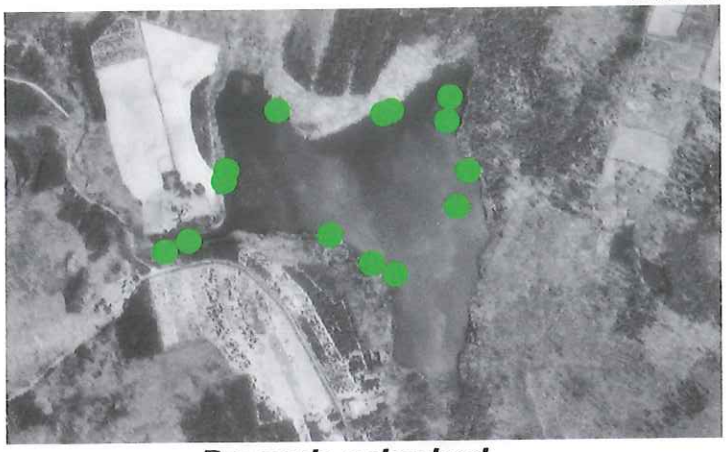
Dalles, PA
Luzerne County, Pennsylvania
Ownership: Nesbitt Family
Contact: Edward Freeman, caretaker

Latitude: 41.39332 deg. N
Longitude: 75.95781 deg. W
Quad: Center Moreland
Surface area: 115.3 acres
Maximum depth: 7--8 feet (at the dam)
Average depth: ca. 4 feet
Elevation: 1,270 feet above mean sea level
Impoundment, dam dates from the 1860s

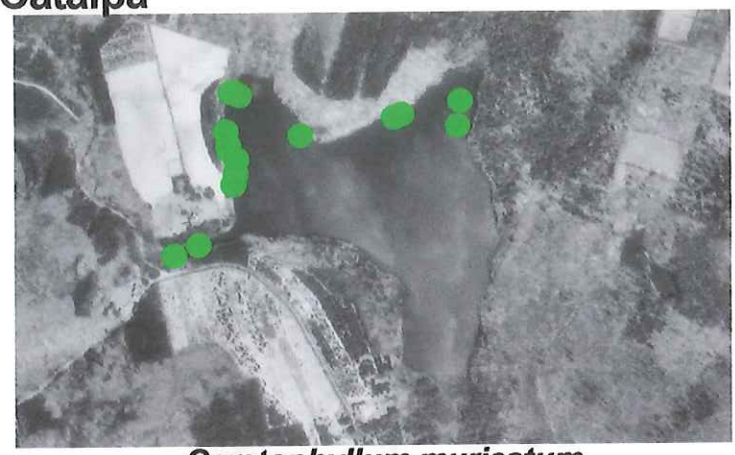
Date visited: July 20, 2004
Number of sampling points: 26
Number of aquatic macrophytes plants recorded: 38, number mapped: 26
PNHP-listed species present: none

Comments:
Most of the lake is 4 feet deep or less; approximately 60% of this lake is completely covered with water-lilies that form a mosaic of pink-flowered and white-flowered forms.

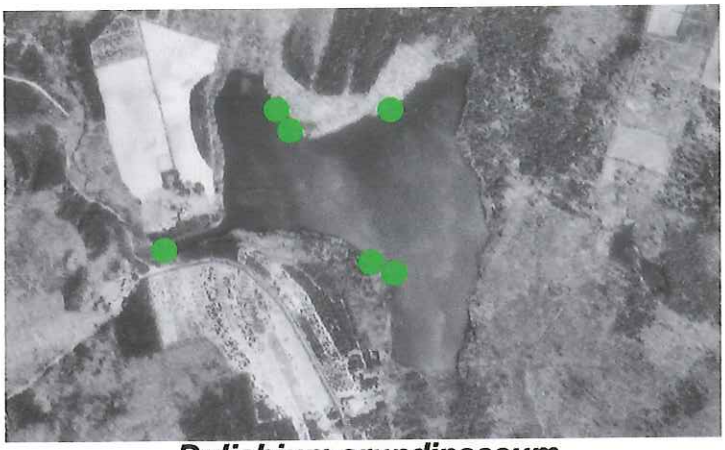
Lake Catalpa



Brasenia schreberi

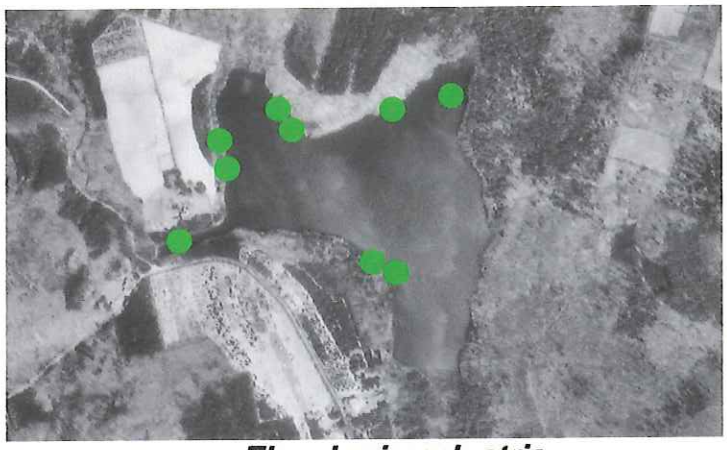


Ceratophyllum muricatum

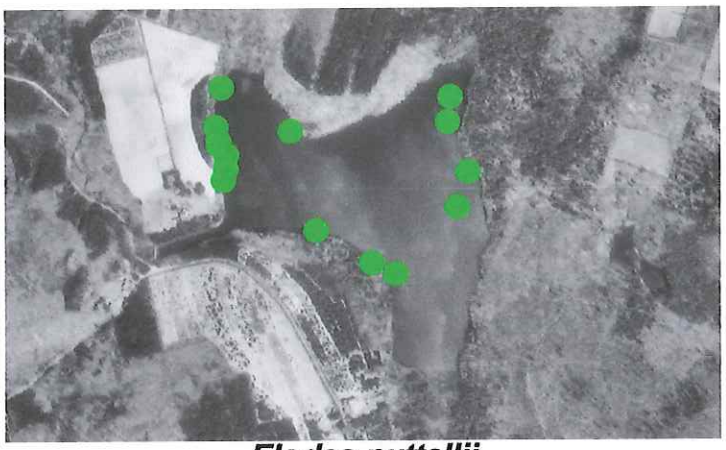


Dulichium arundinaceum

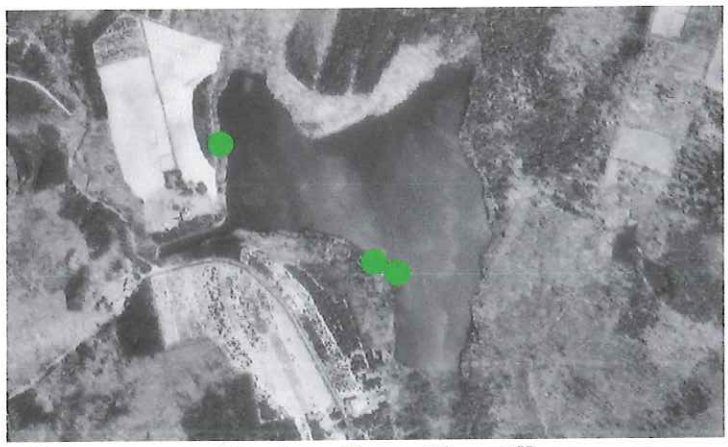
Eleocharis acicularis



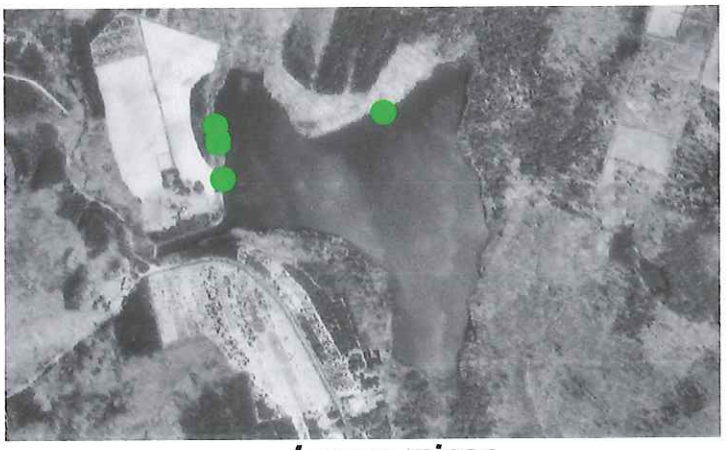
Eleocharis palustris



Elodea nuttallii

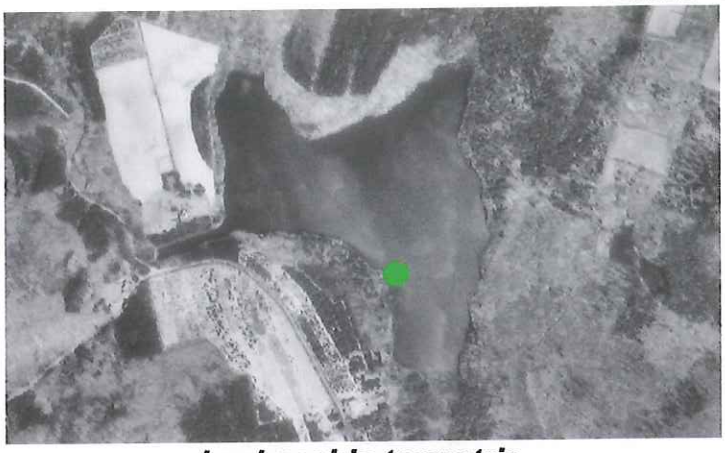


Fontanalis sullivantii

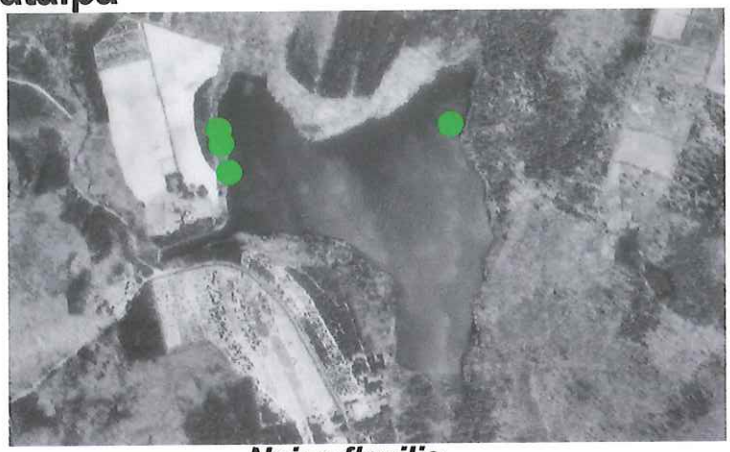


Lemna minor

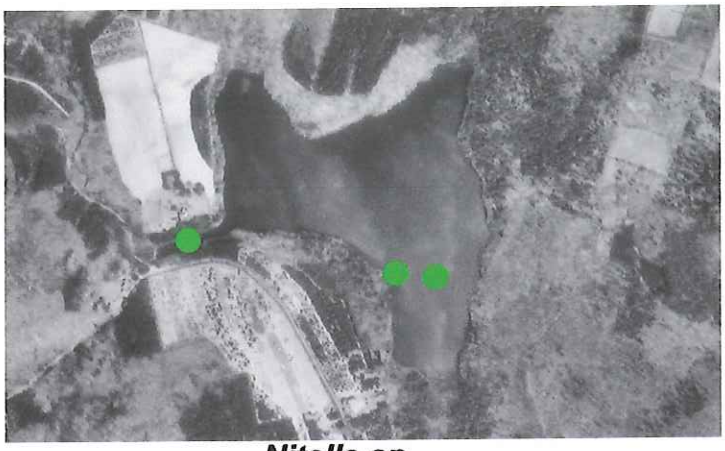
Lake Catalpa



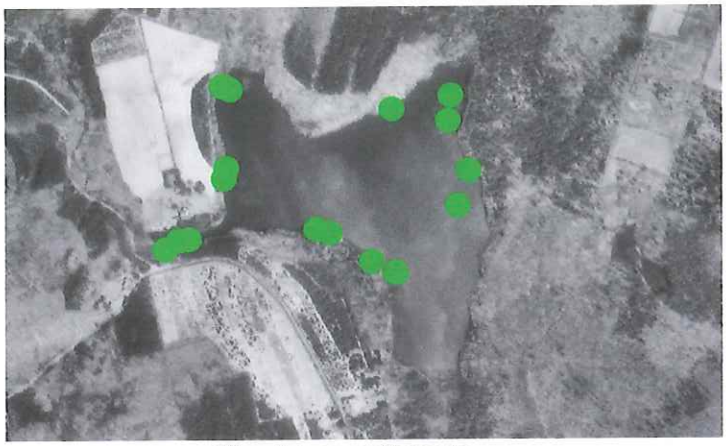
Lysimachia terrestris



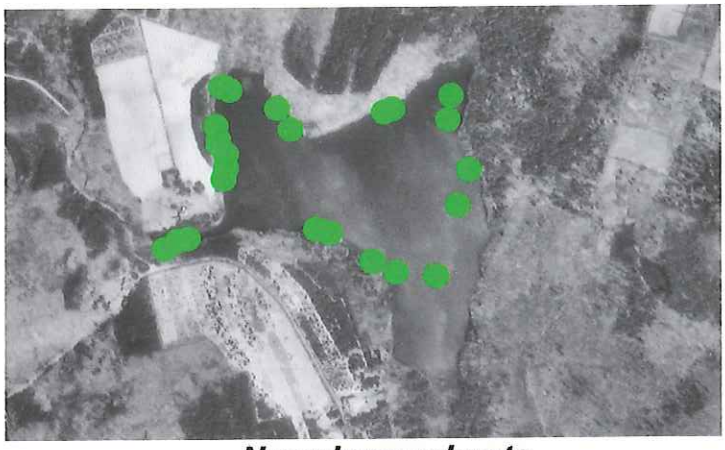
Najas flexilis



Nitella sp.



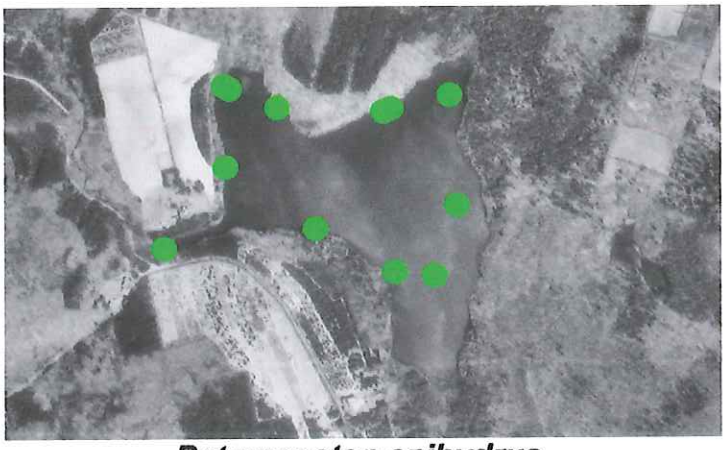
Nuphar variegata



Nymphaea odorata

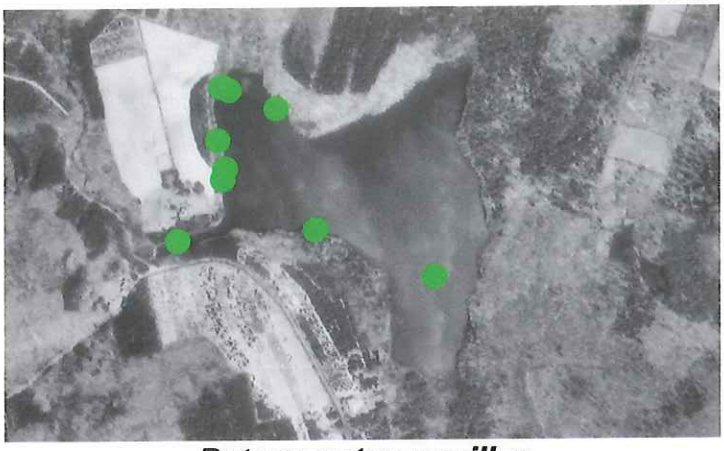
Pontederia cordata

Potamogeton diversifolius

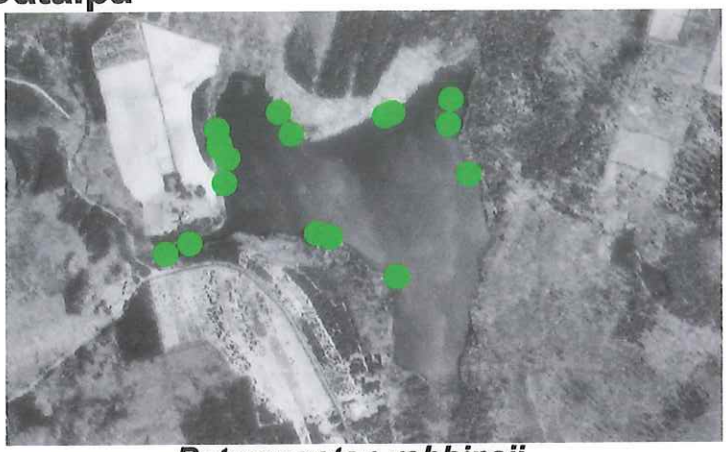


Potamogeton epihydrus

Lake Catalpa

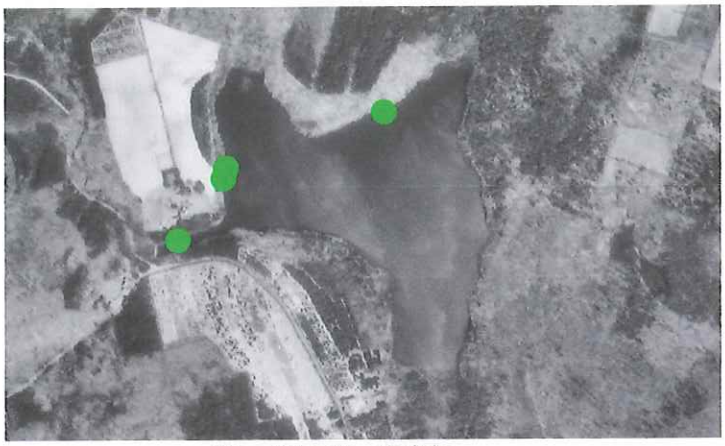


Potamogeton pusillus



Potamogeton robbinsii

Sagittaria latifolia



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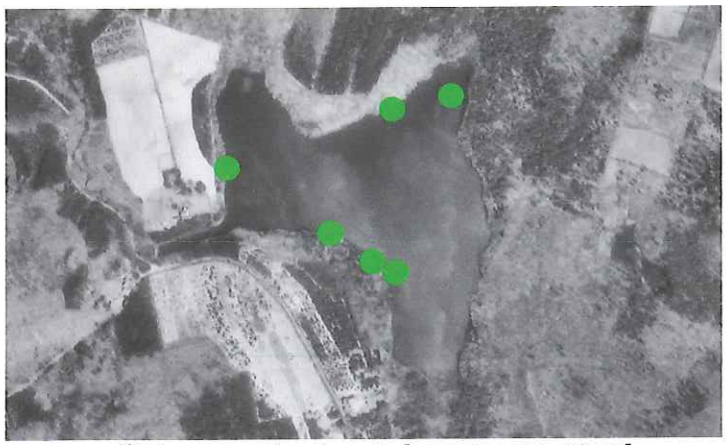
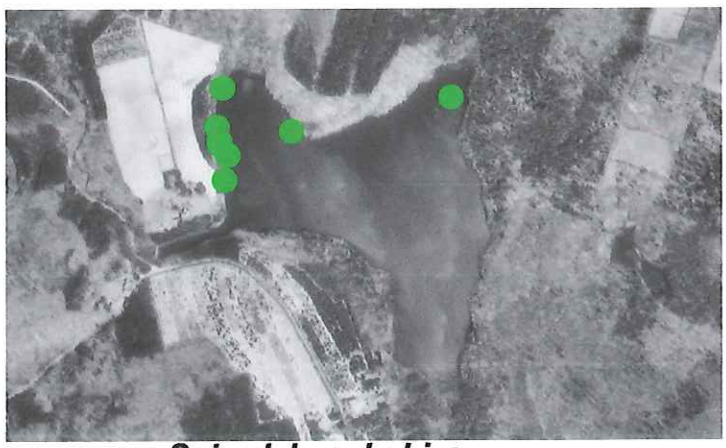


Schoenoplectus tabernaemontani

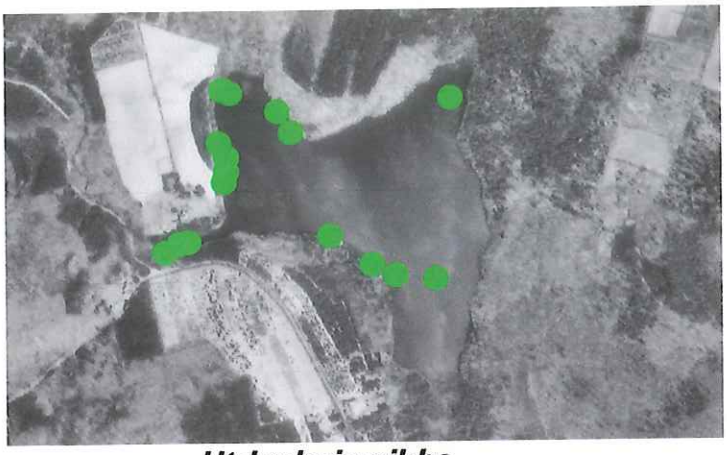
Sparganium americanum

Sparganium eurycarpon

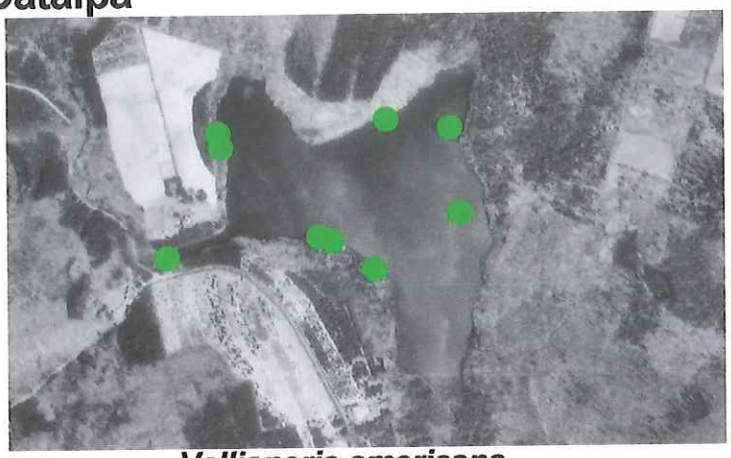


Spirodela polyrhiza

Lake Catalpa



Utricularia gibba



Vallisneria americana

Lake Minisink

Delaware State Forest
Pike County, Pennsylvania
Ownership: DCNR Bureau of Forestry
Contact: Jerry Kelly, District Forester

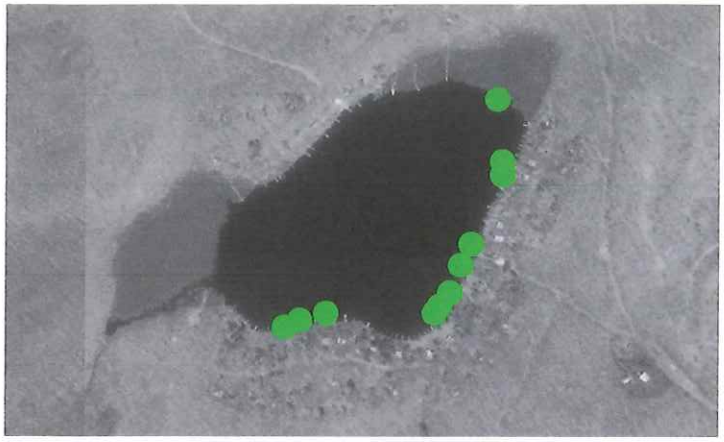
Latitude: 41.21595 deg. N
Longitude: 75.05289 deg. W
Quad: Twelve Mile Pond
Surface area: 31.74 acres
Maximum depth: 15 feet
Elevation: 1,341 feet above mean sea level
Low dam present at the outlet

Date visited: July 23, 2004 and August 6, 2004
Number of sampling points: 79
Number of plants recorded: 66, number mapped: 25
PNHP-listed species present:

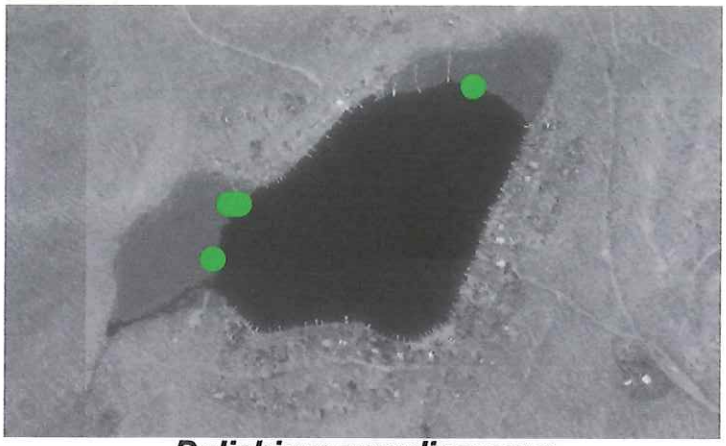
Juncus militaris
Nymphoides cordata
Schoenoplectus subterminalis
Utricularia intermedia
Bidens discoidea

Comments:
This state forest lake has leased cabin sites along the south, east, and northwest shoreline. The *Juncus militaris* population is the largest that we are aware of in the state. The largest patches occur along the shoreline in front of cabins on the south and east sides of the lake, where leaseholders have demanded that vegetation control be undertaken to clear access to their docks.

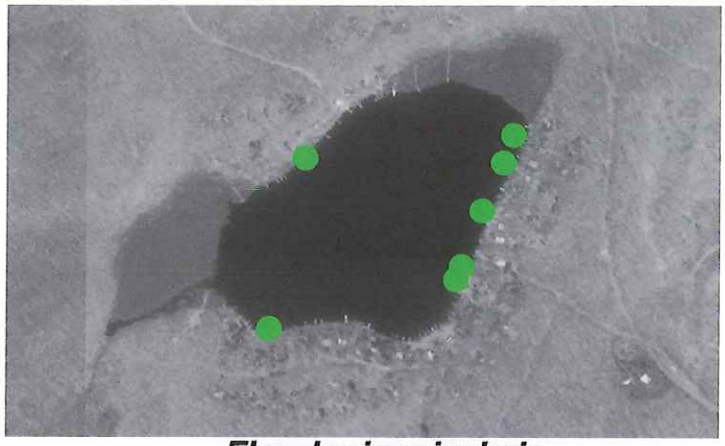
Lake Minisink



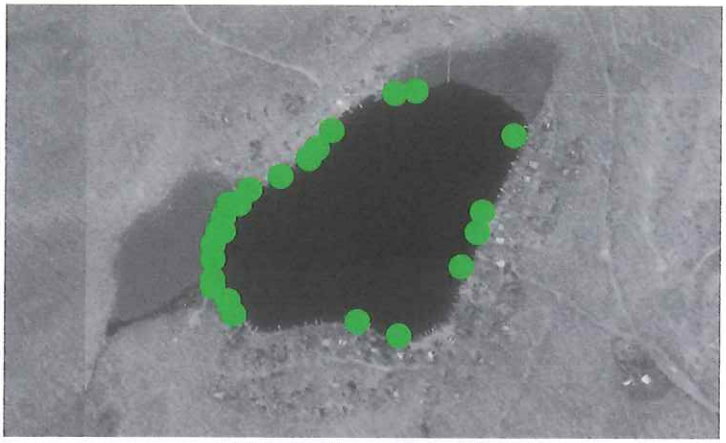
Brasenia schreberi



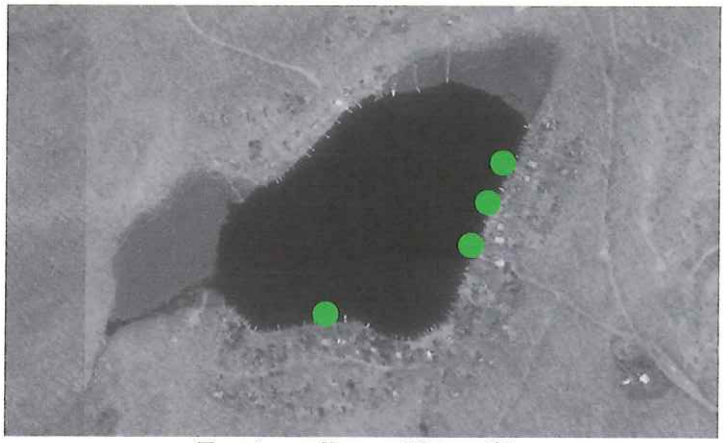
Dulichium arundinaceum



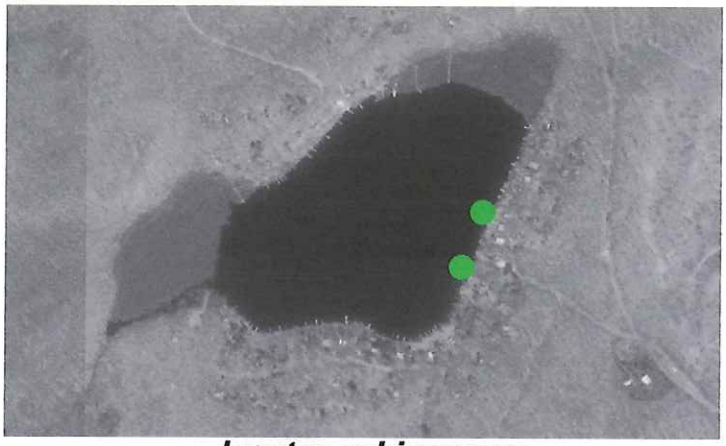
Eleocharis acicularis



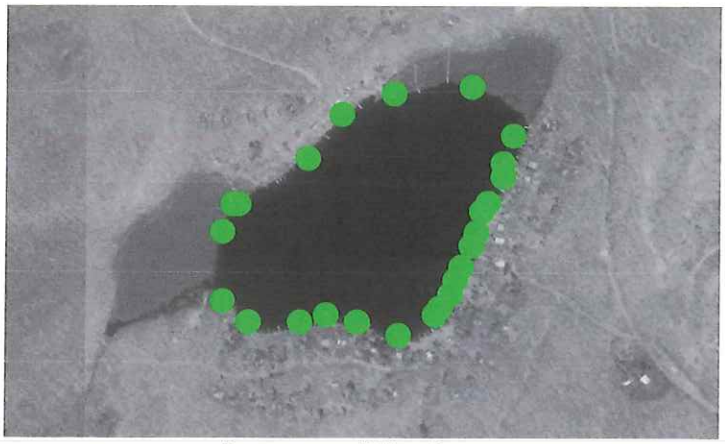
Eriocaulon aquaticum



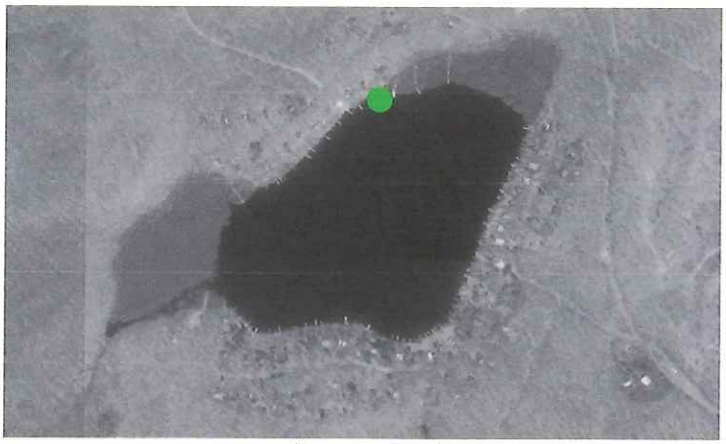
Fontanalis sullivantii



Isoetes echinospora

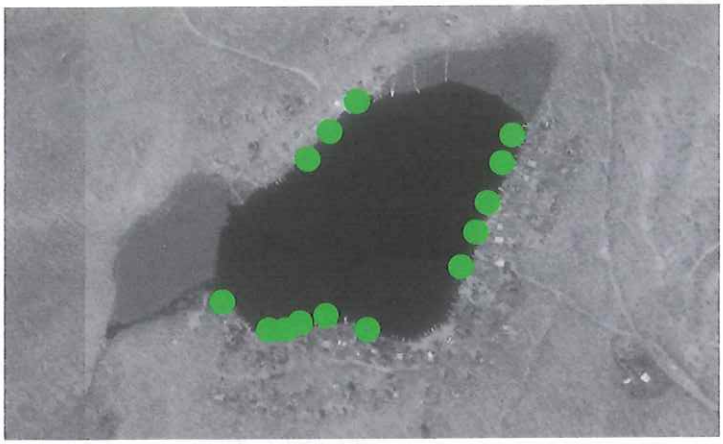


Juncus militaris

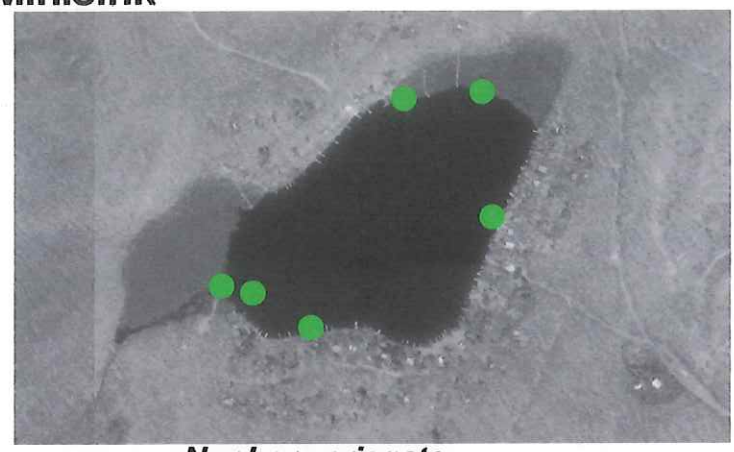


Lemna minor

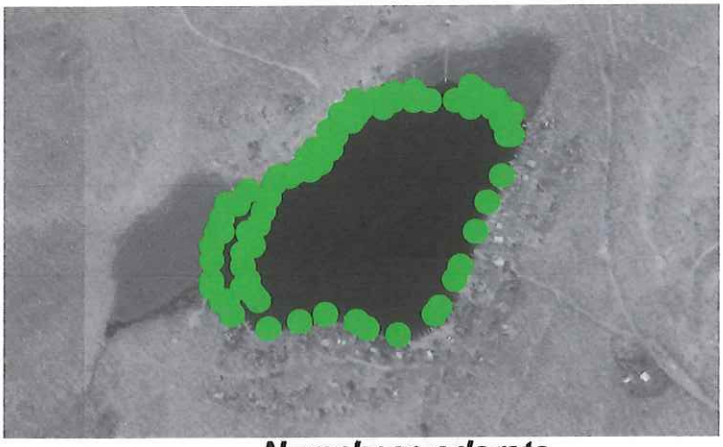
Lake Minisink



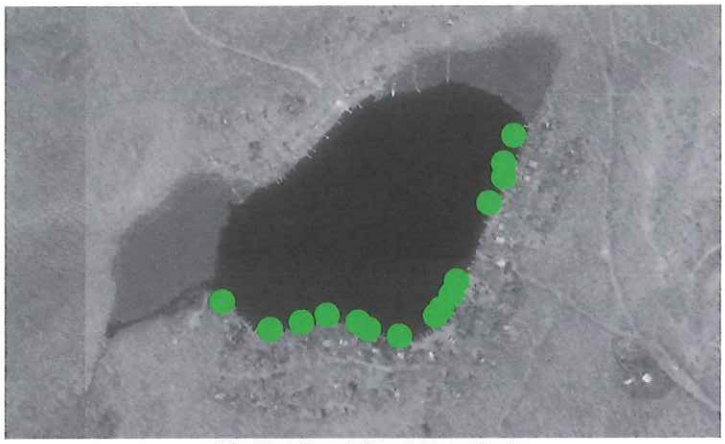
Najas flexilis



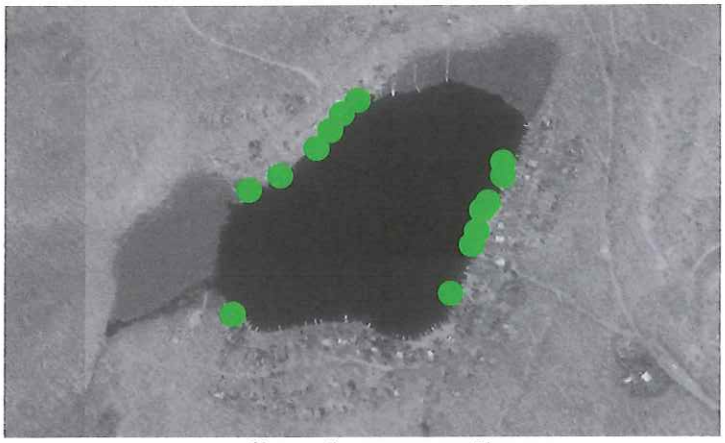
Nuphar variegata



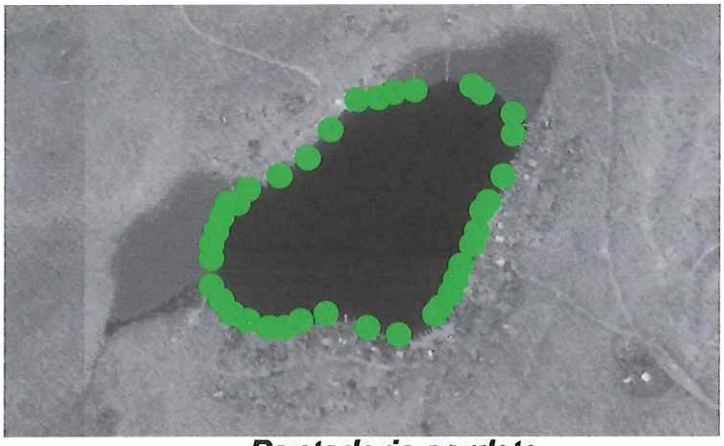
Nymphaea odorata



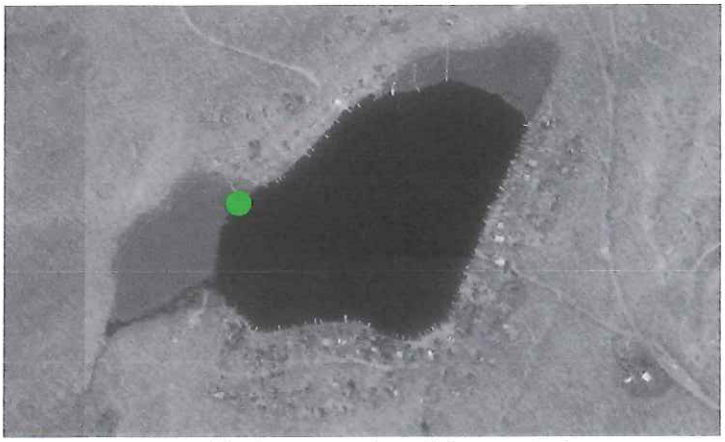
Nymphoides cordata



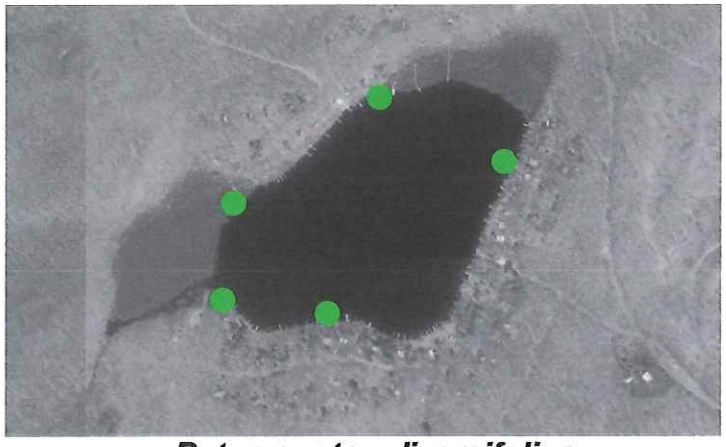
Orontium aquaticum



Pontederia cordata

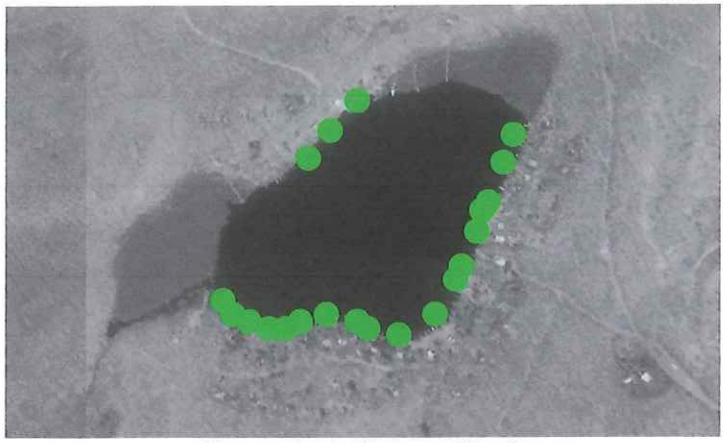


Potamogeton bicupulatus

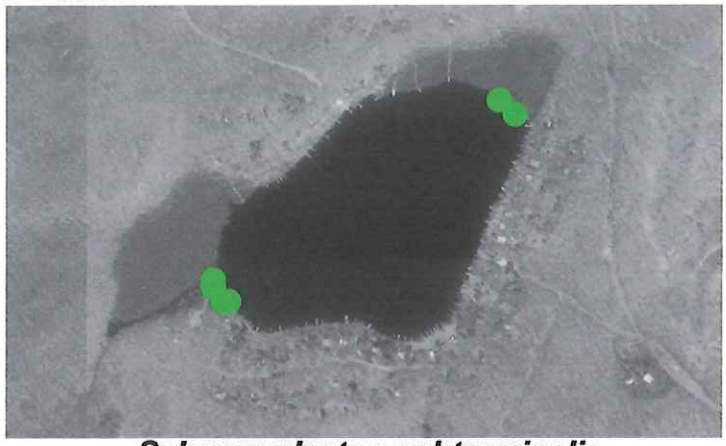


Potamogeton diversifolius

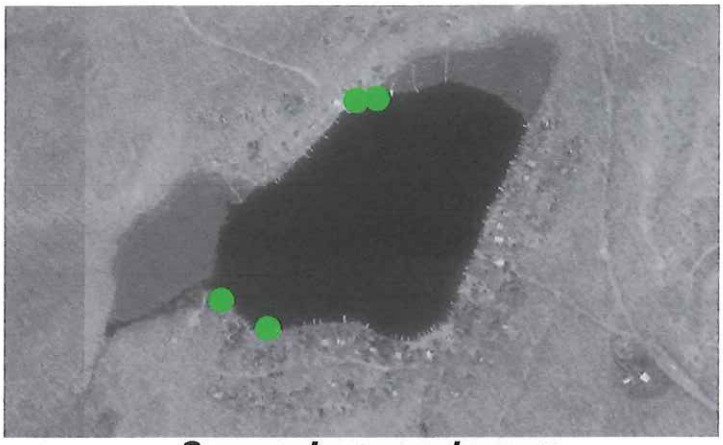
Lake Minisink



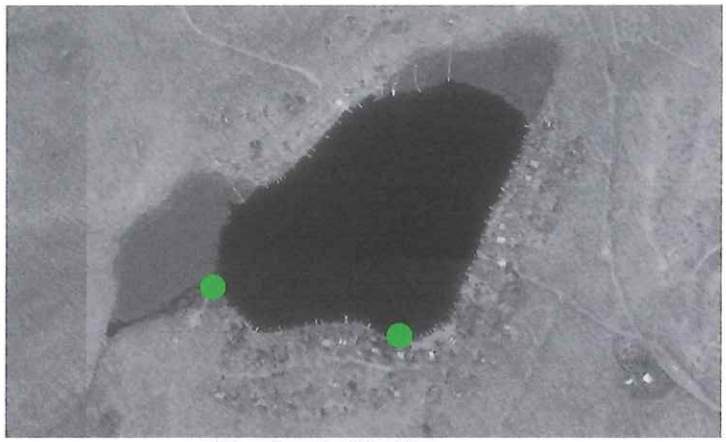
Potamogeton epihydrus



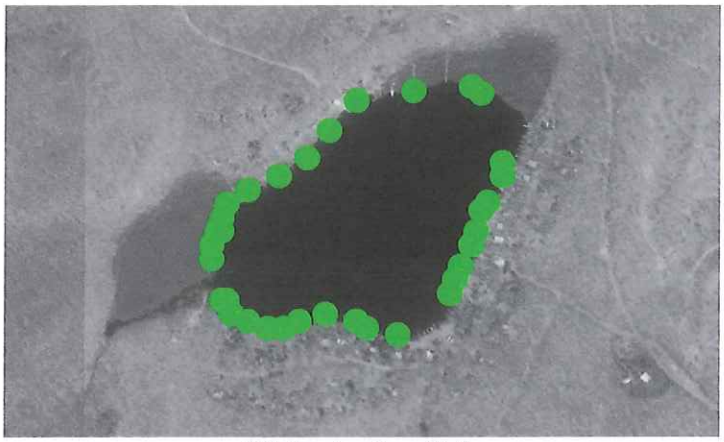
Schoenoplectus subterminalis



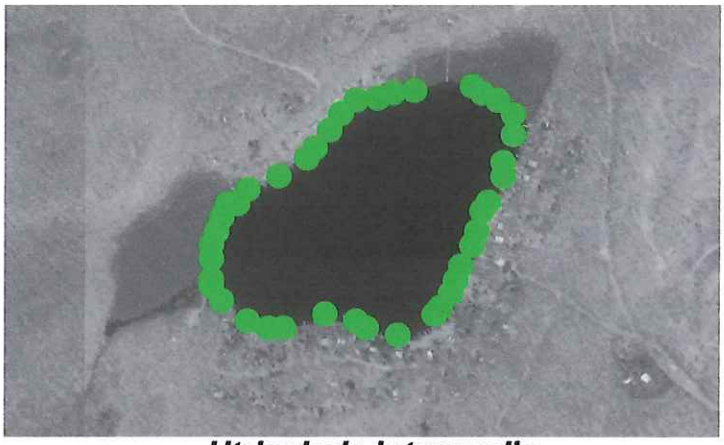
Sparganium americanum



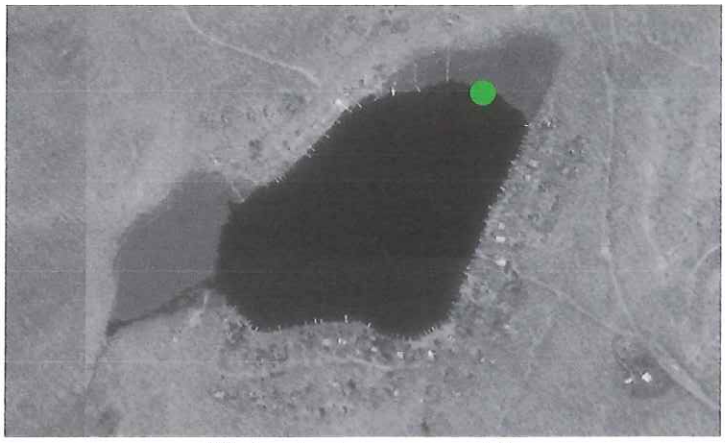
Typha latifolia



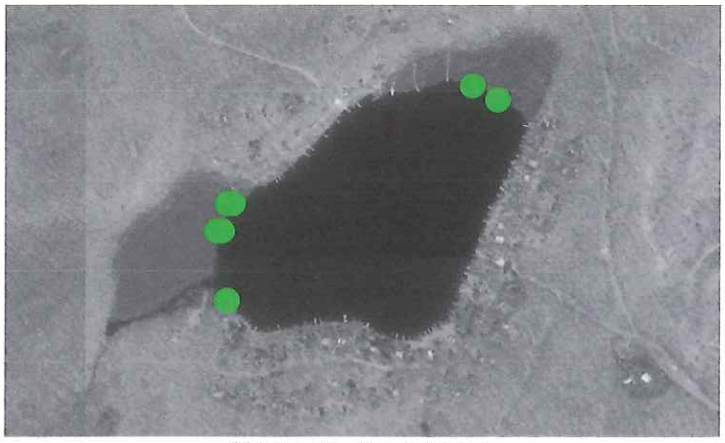
Utricularia gibba



Utricularia intermedia

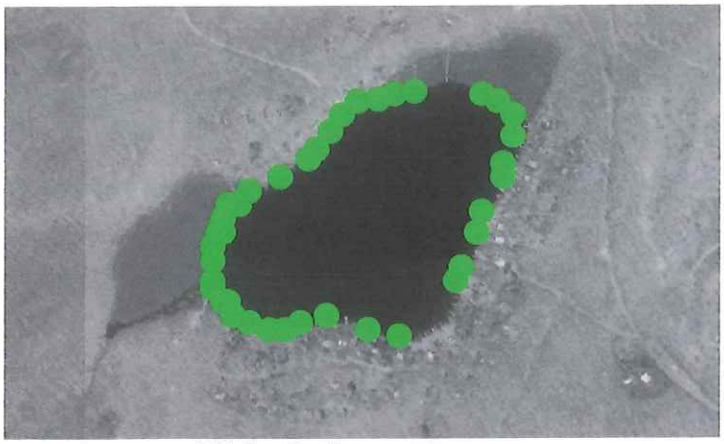


Utricularia macrorhiza



Utricularia minor

Lake Minisink



Utricularia purpurea

Lake of Meadows

Warren Center, PA
Susquehanna and Bradford Counties, Pennsylvania
Ownership: lake owners association
Contact: John Fiala, lake resident

Latitude: 41.93337 deg. N
Longitude: 76.13960 deg W
Quad: Little Meadows
Surface area: 78.8 acres
Maximum depth: 19 feet
Elevation: 1,532 feet above mean sea level
Low dam present at the outlet

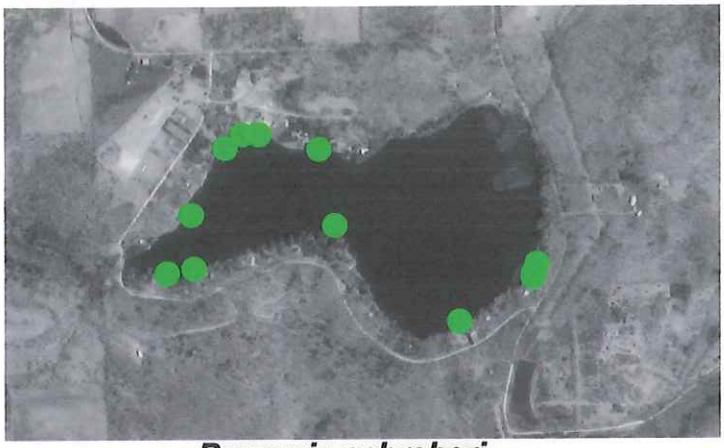
Date visited: July 7, 2004
Number of sampling points: 51
Number of aquatic macrophytes plants recorded: 39, number mapped: 21
PNHP-listed species present:
Andromeda polifolia

Comments:
The water in this lake was very murky; we found no plants at depths greater than 1.5 m. The lake has been treated with copper sulfate twice a year in recent years; but it had not been treated during 2004 as of our July 7 visit.

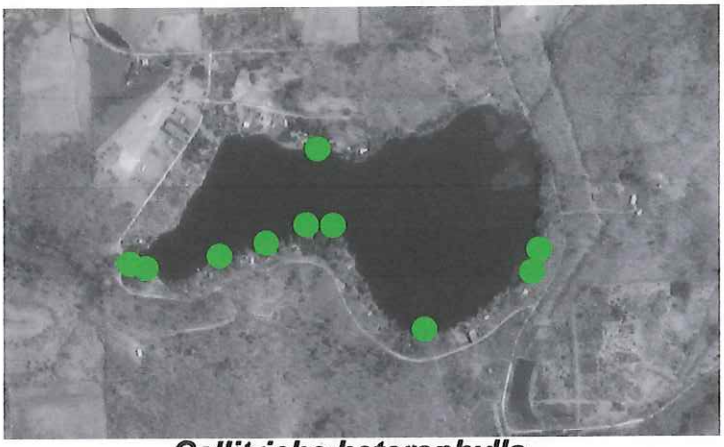
The lake has a low dam at the outlet and several boggy islands at the east end.

Lake of Meadows

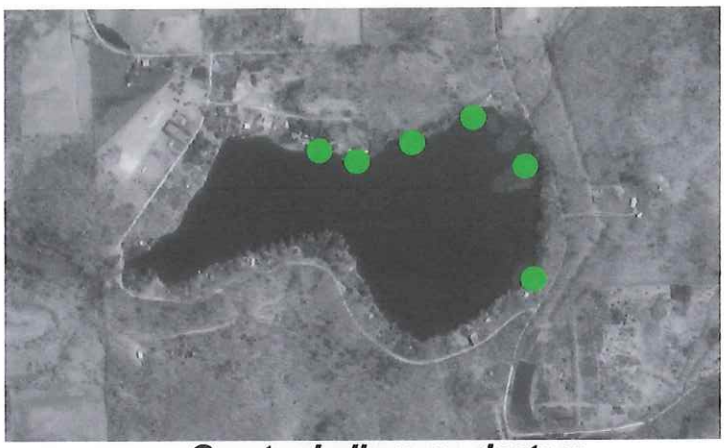
Andromeda polifolia



Brasenia schreberi

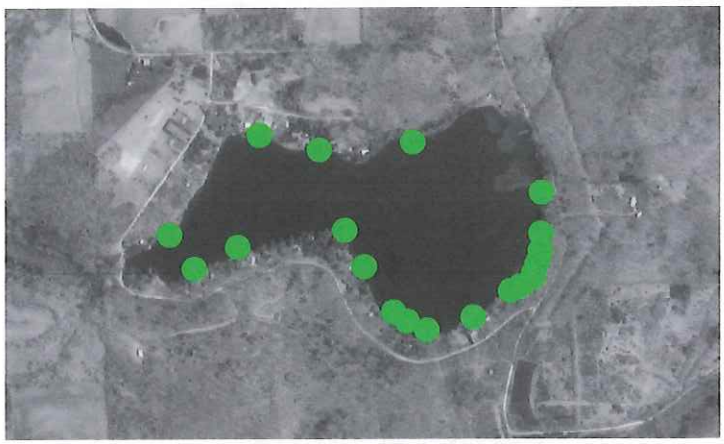


Callitriche heterophylla

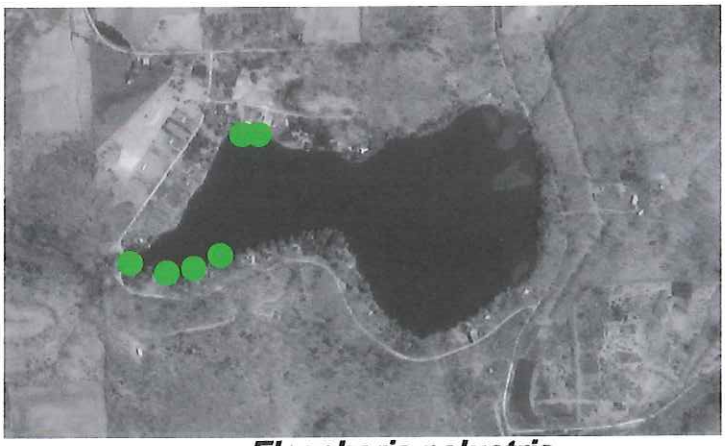


Ceratophyllum muricatum

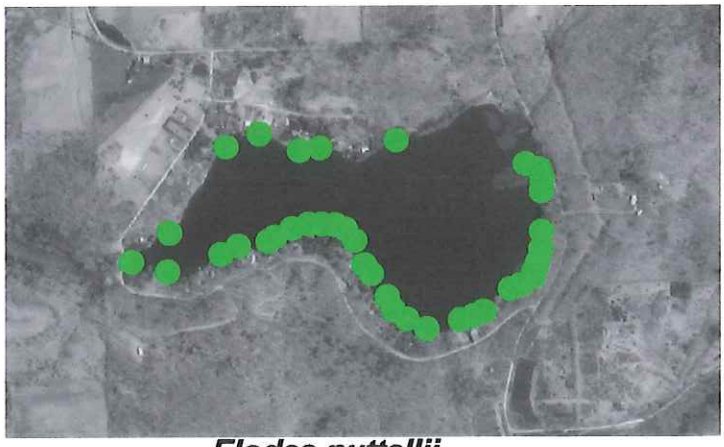
Dulichium arundinaceum



Eleocharis acicularis

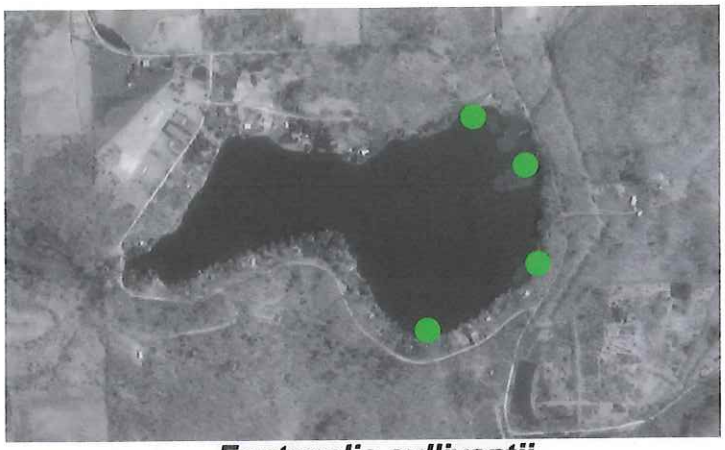


Eleocharis palustris



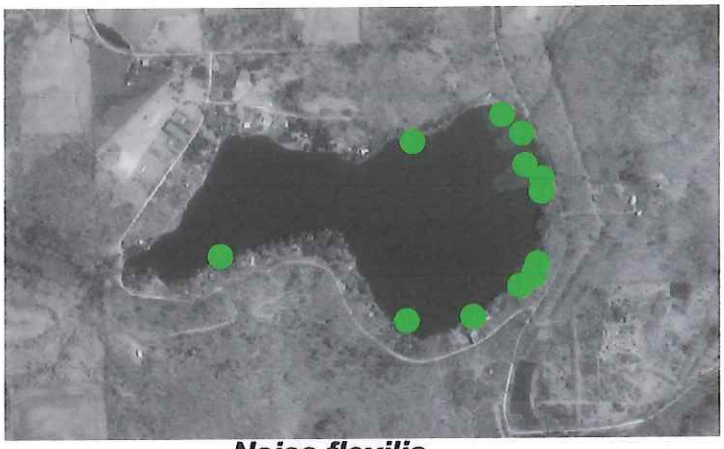
Elodea nuttallii

Lake of Meadows

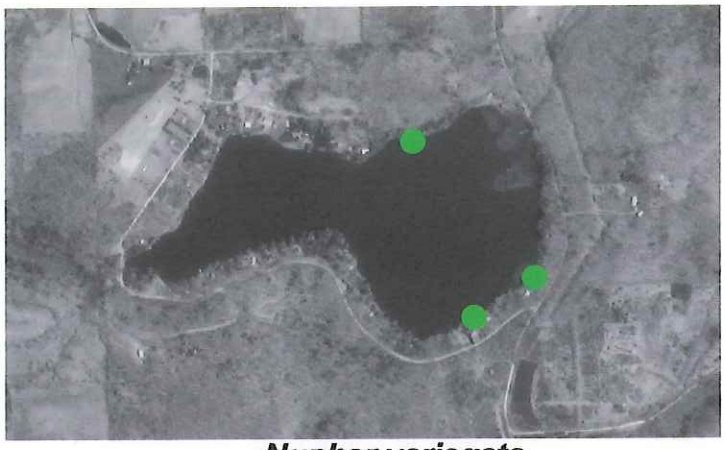


Fontanalis sullivantii

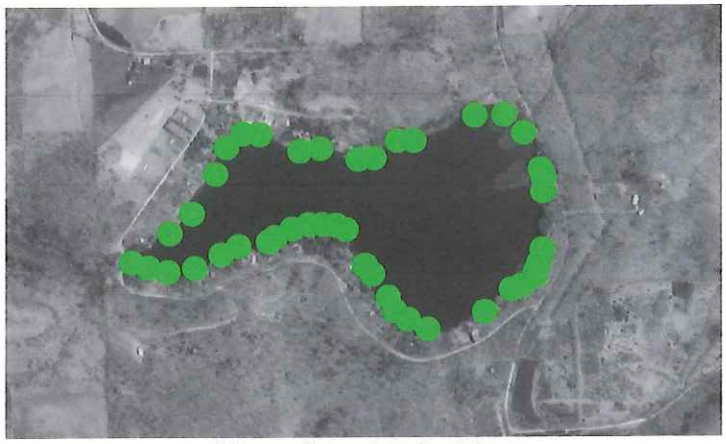
Lysimachia terrestris



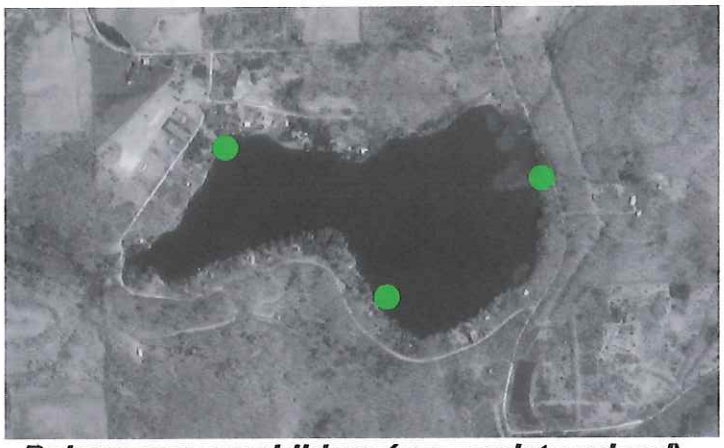
Najas flexilis



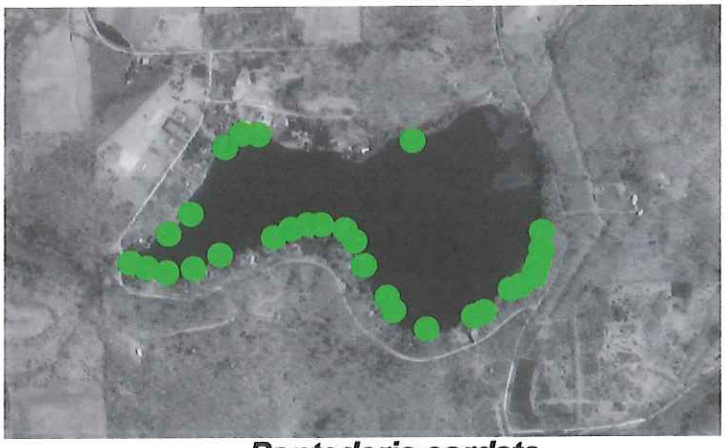
Nuphar variegata



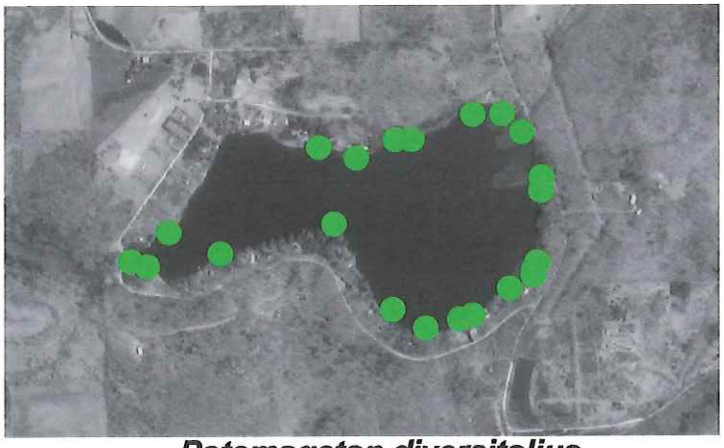
Nymphaea odorata



Polygonum amphibium (var. undetermined)

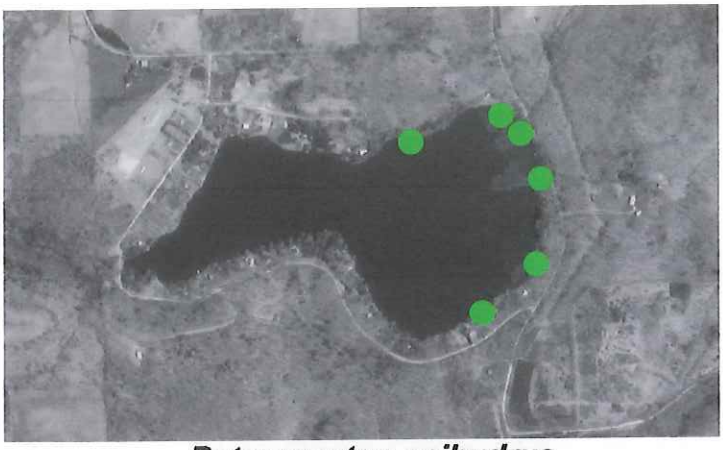


Pontederia cordata

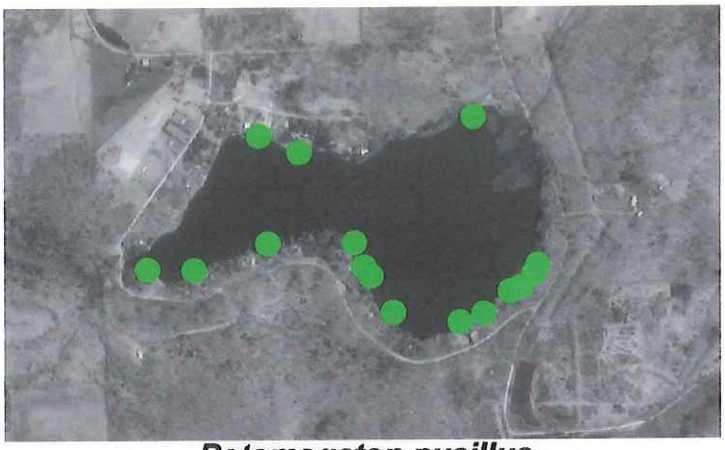


Potamogeton diversitolius

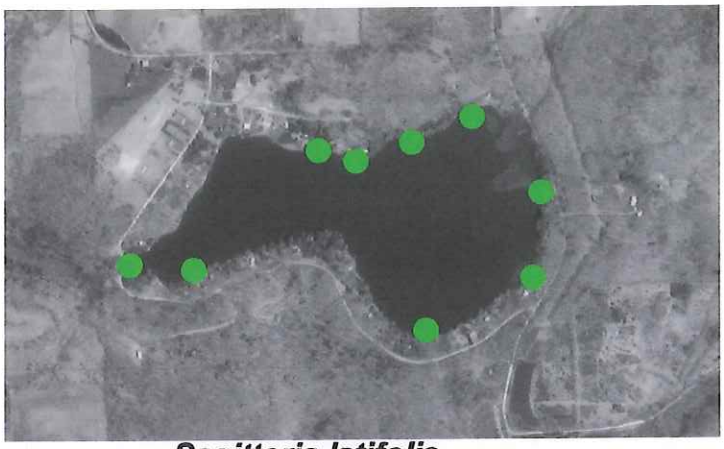
Lake of Meadows



Potamogeton epihydrus



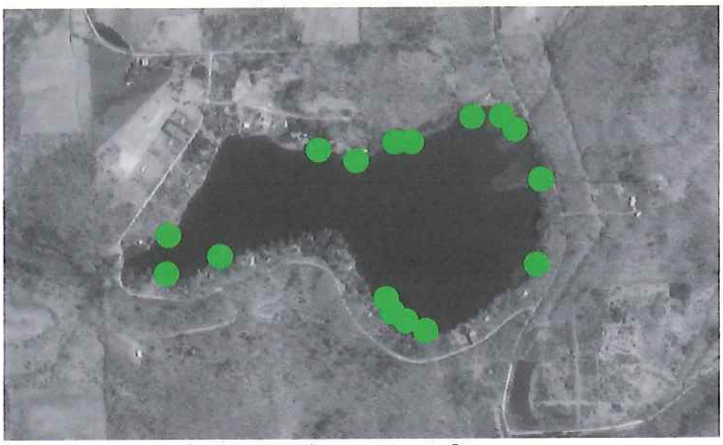
Potamogeton pusillus



Sagittaria latifolia

Sagittaria rigida

Schoenoplectus tabernaemontani



Sparganium americanum

Lake Paupack

Greentown, PA
Pike County, Pennsylvania
Ownership: Lake Paupac Club
Contact: Sandra Drayer, resident

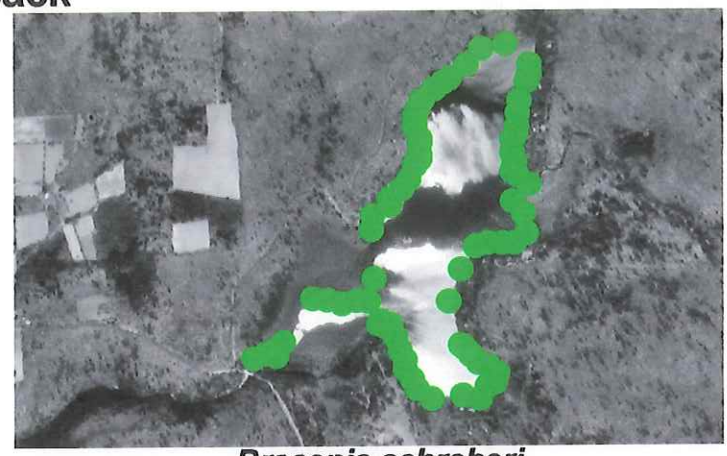
Latitude: 41.32479 deg. N
Longitude: 75.25760 deg. W
Quad: Newfoundland
Surface area: 109 acres
Maximum depth: 25 feet
Mean depth: 13.1 feet
Elevation: 1,608 feet above mean sea level
Natural glacial lake

Date visited: July 14—15, 2004
Number of sampling points: 109
Number of aquatic macrophytes plants recorded: 105, number mapped: 24
PNHP-listed species present:
Andromeda polifolia

Comments:
The residents are very concerned about maintaining high water quality; motorboats are not allowed on the lake and any boats from outside are strongly discouraged. Plants recorded total includes floristic composition of the bogs on both sides of the outlet.

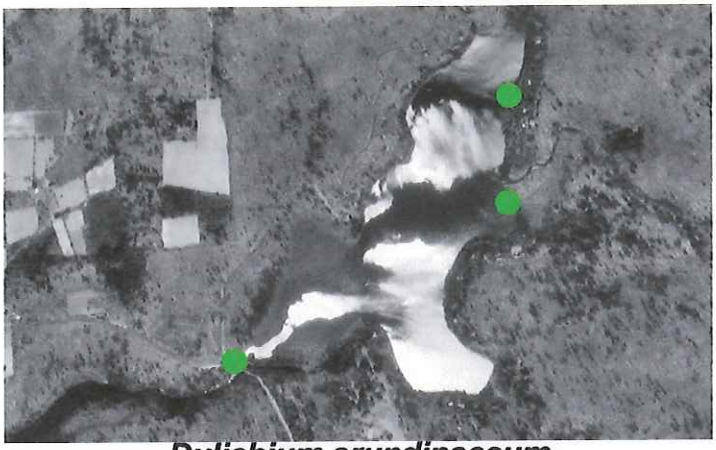
Lake Paupack

Andromeda polifolia

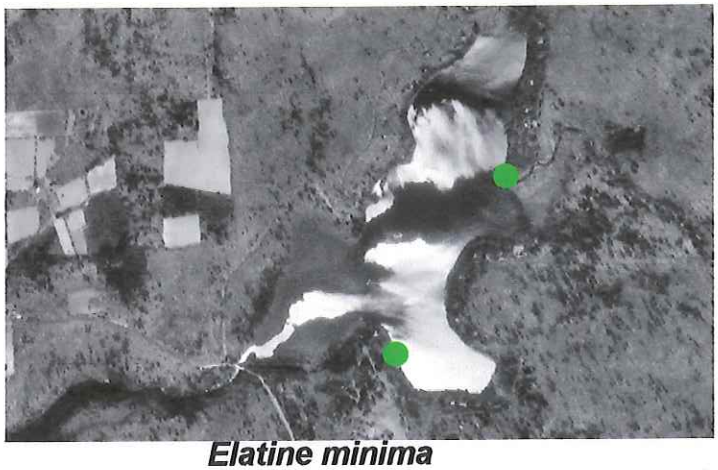


Brasenia schreberi

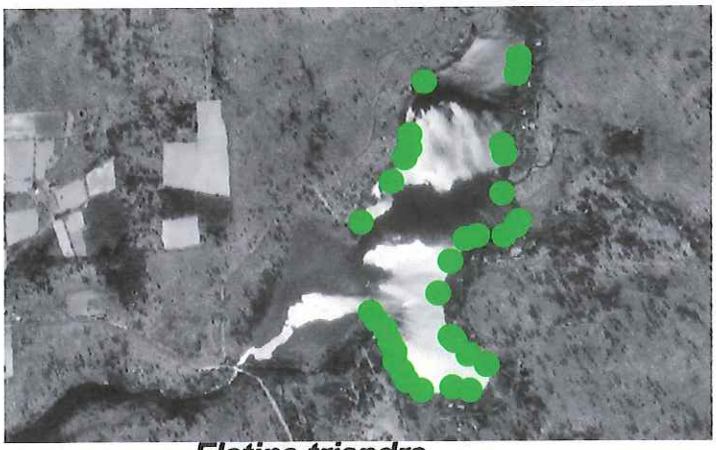
Callitriche heterophylla



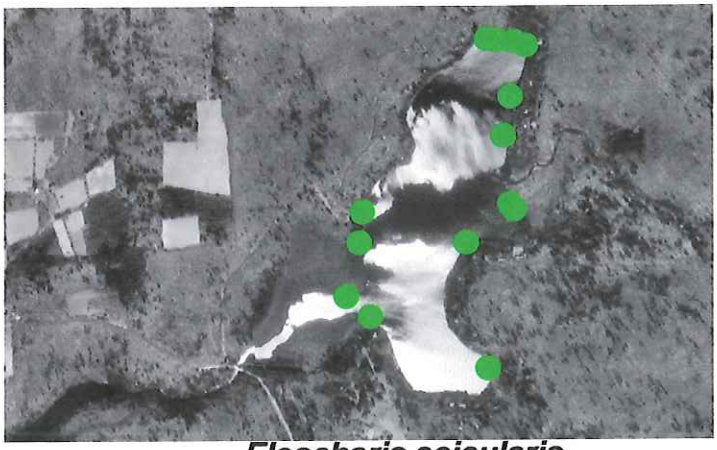
Dulichium arundinaceum



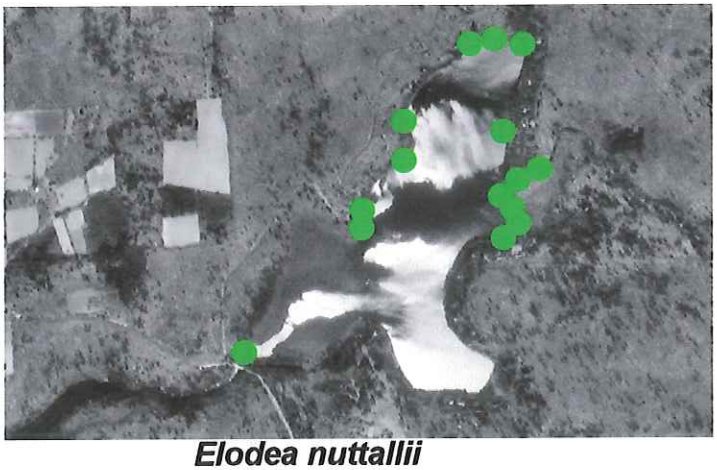
Elatine minima



Elatine triandra

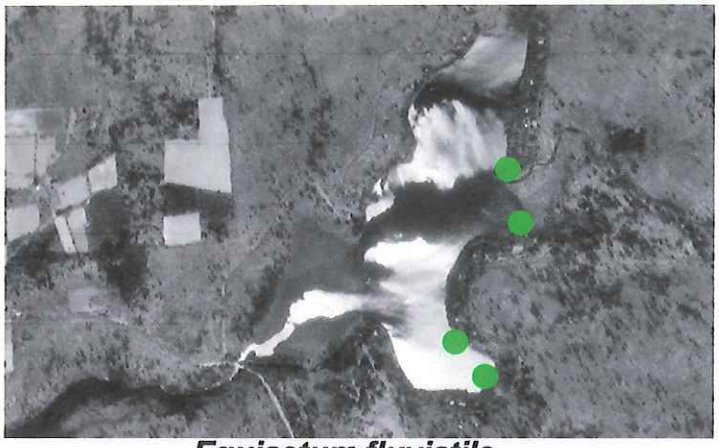


Eleocharis acicularis

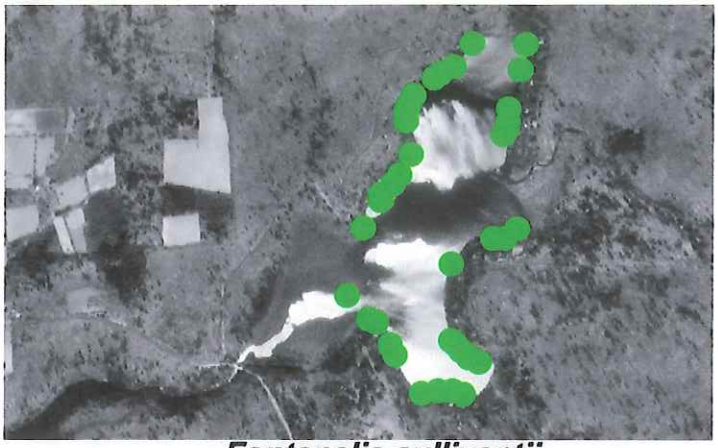


Elodea nuttallii

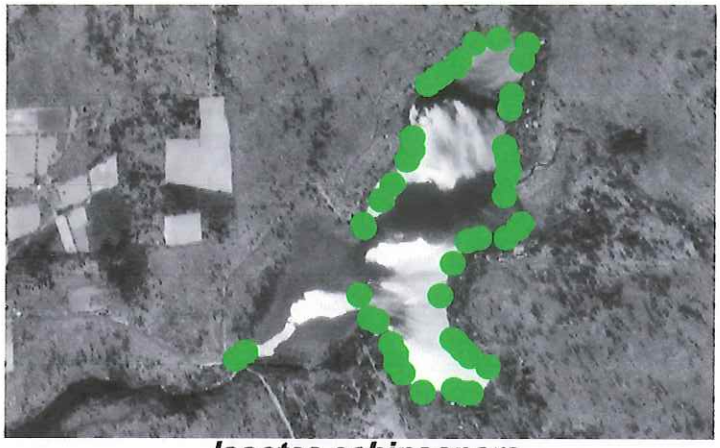
Lake Paupack



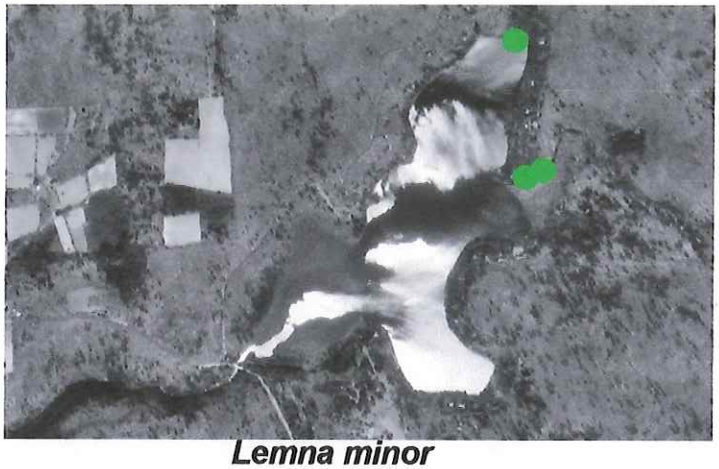
Equisetum fluviatile



Fontanalis sullivantii

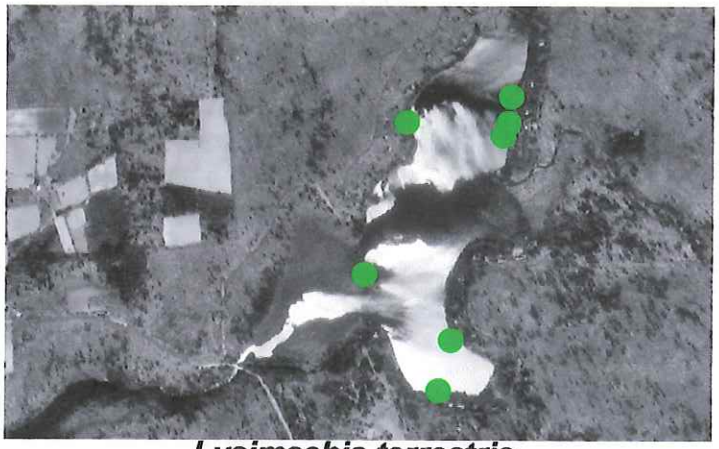


Isoetes echinospora

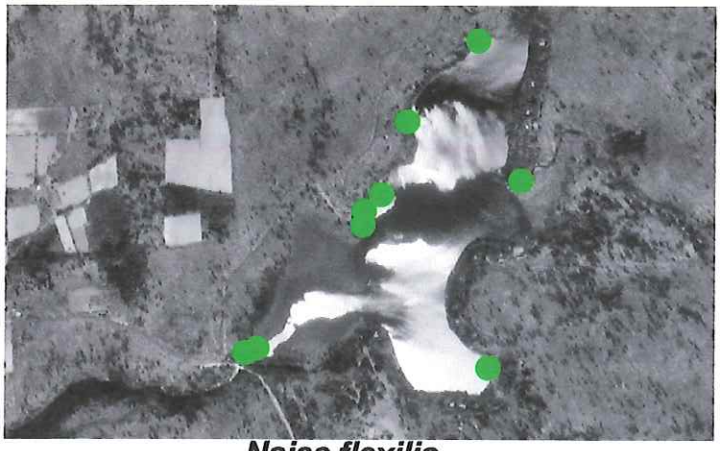


Lemna minor

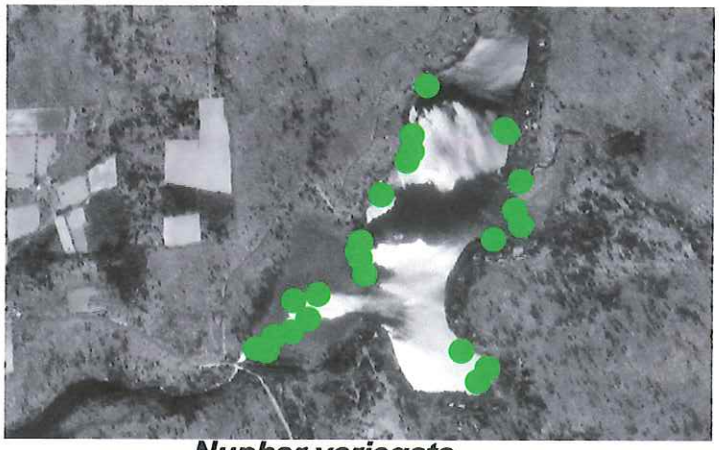
Ludwigia palustris



Lysimachia terrestris

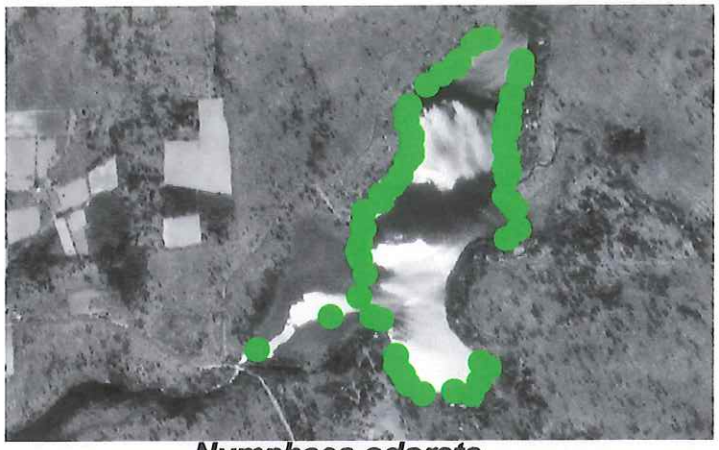


Najas flexilis

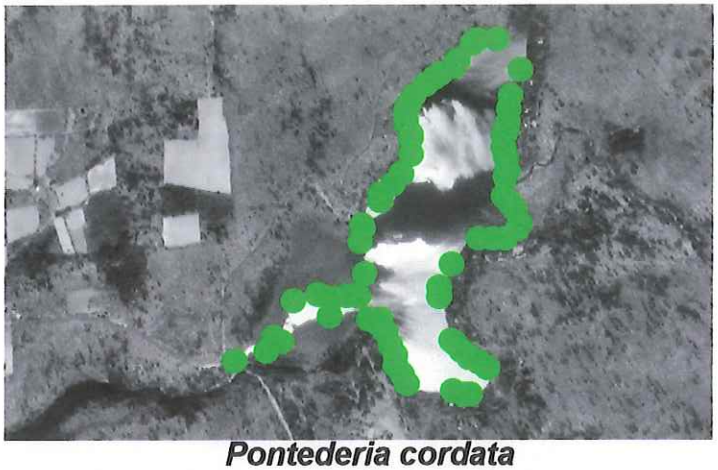


Nuphar variegata

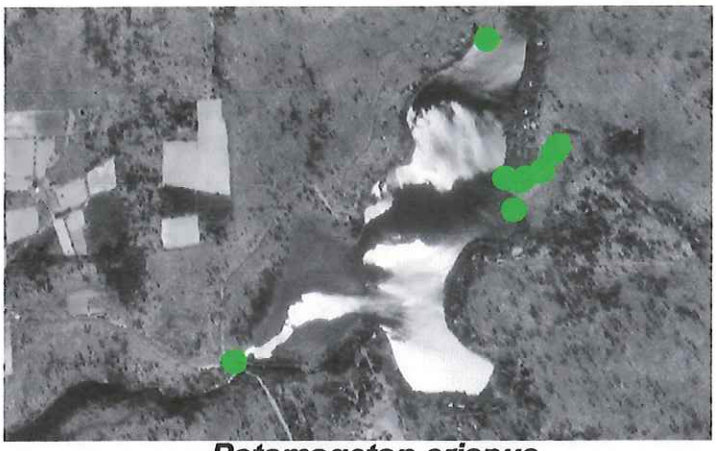
Lake Paupack



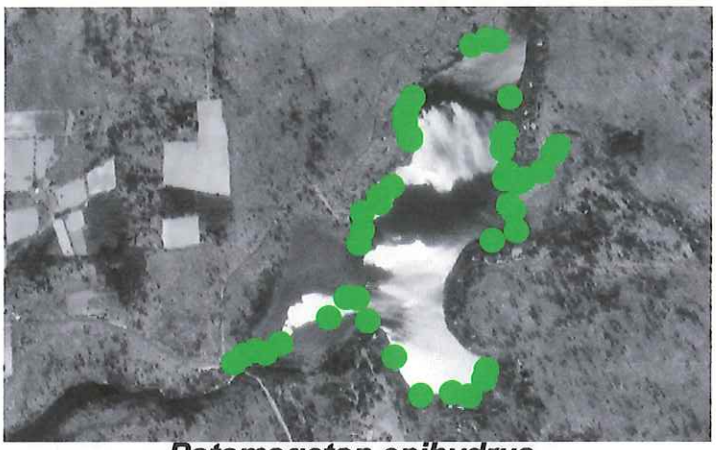
Nymphaea odorata



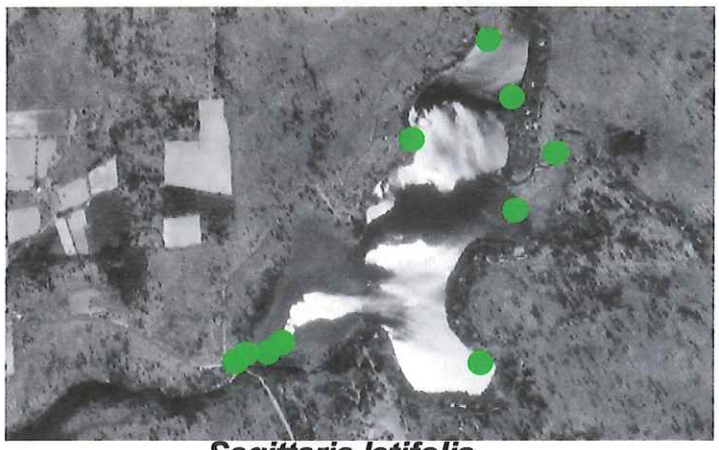
Pontederia cordata



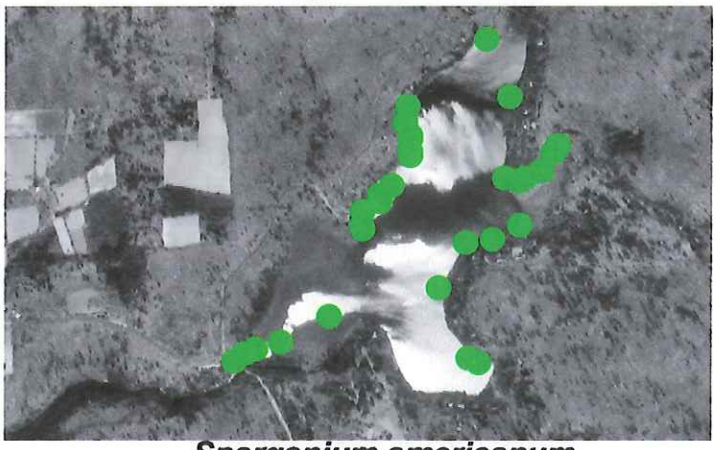
Potamogeton crispus



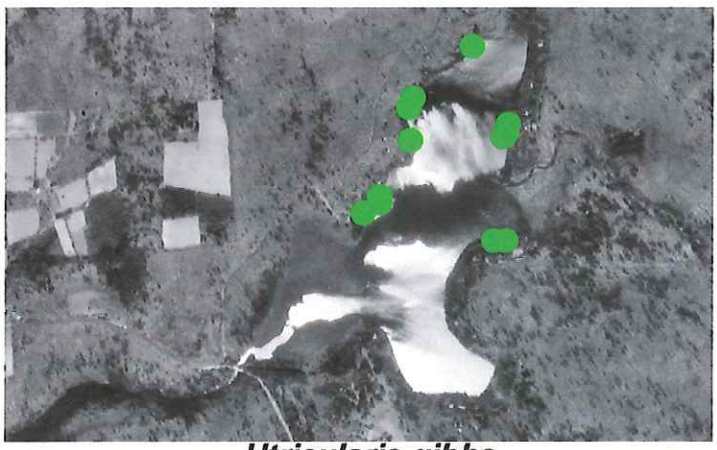
Potamogeton epihydrus



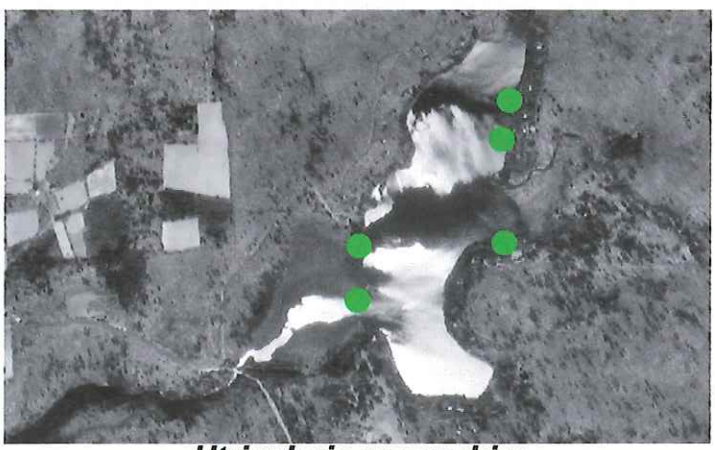
Sagittaria latifolia



Sparganium americanum

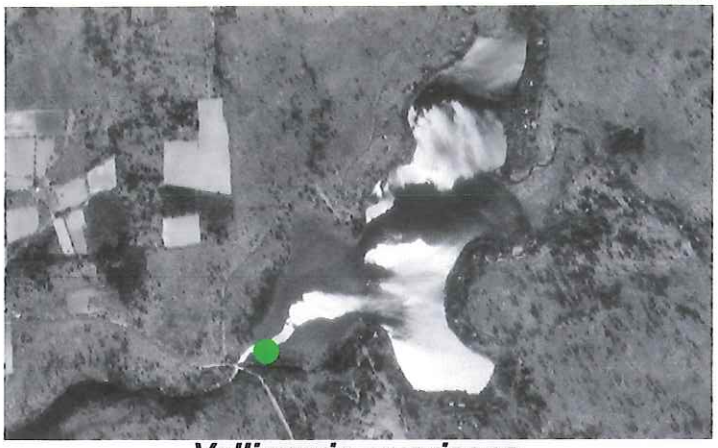


Utricularia gibba



Utricularia macrorhiza

Lake Paupack



Vallisneria americana

Log Tavern Pond

Milford, PA
Pike County, Pennsylvania
Ownership: Two different associations of lake owners
Contact: Tom Cawley, resident

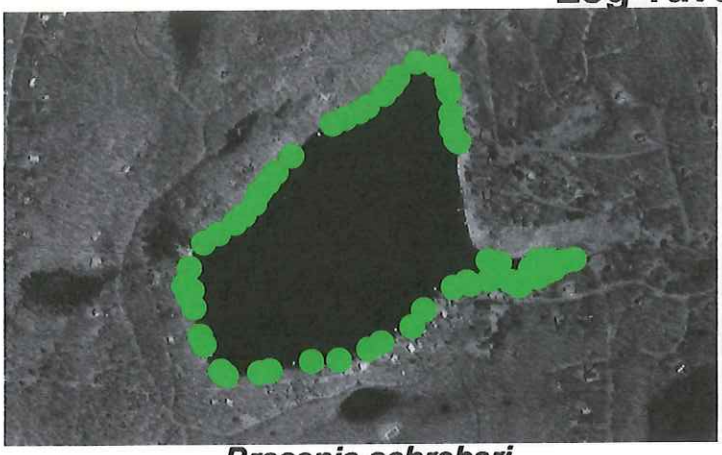
Latitude: 41.31153 deg. N
Longitude: 74.92745 deg. W
Quad: Edgemere
Surface area: 75.5 acres
Maximum depth: 80 feet (as measured by our depth gauge)
Elevation: 1,301 feet above mean sea level
Natural glacial lake

Date visited: June 30, 2004
Number of sampling points: 80
Number of aquatic macrophytes plants recorded: 36, number mapped: 24
PNHP-listed species present:

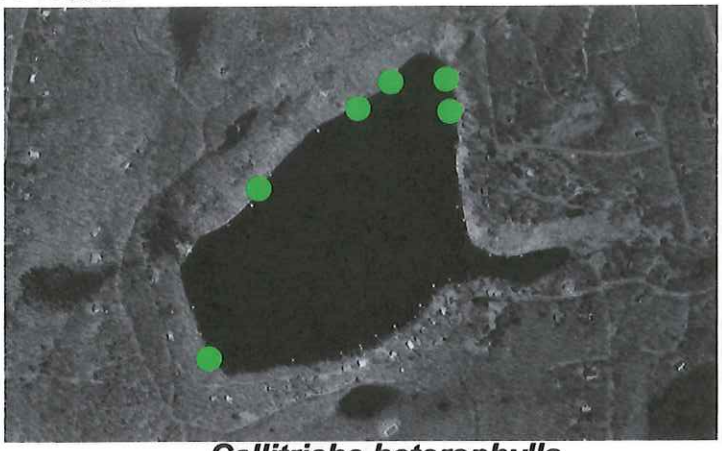
Juncus militaris
Lobelia dortmanna
Schoenoplectus subterminalis
Utricularia cornuta
Utricularia inflata

Comments:
This is a very deep lake with clear water. The littoral zone is very narrow except at the outlet, which is shallow throughout.

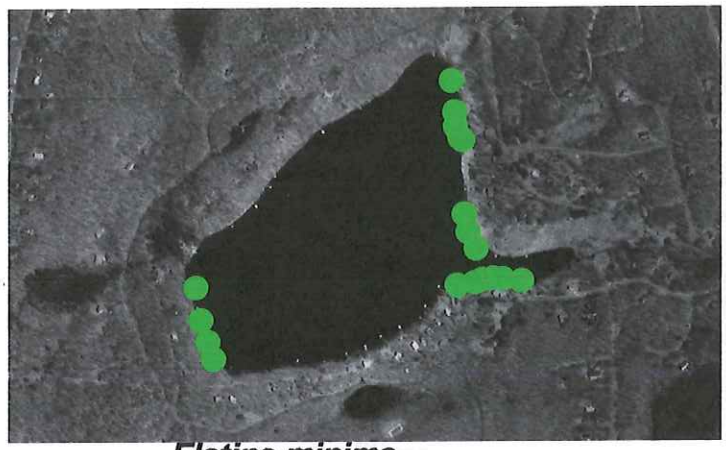
Log Tavern Pond



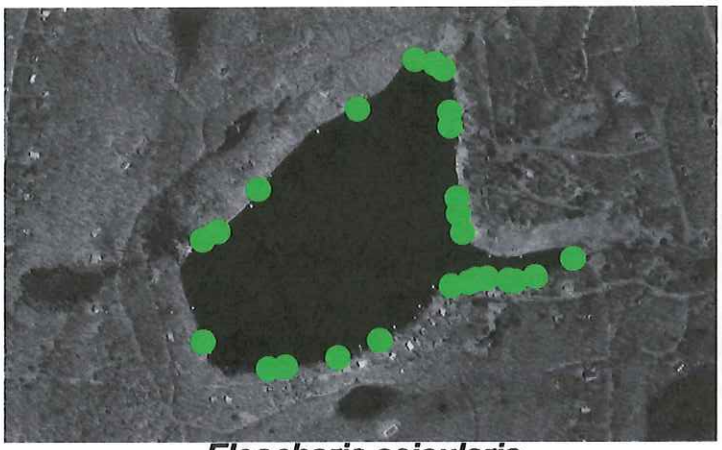
Brasenia schreberi



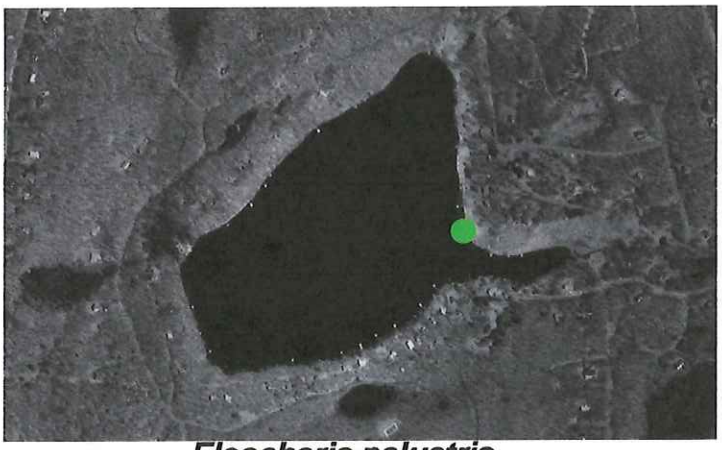
Callitriche heterophylla



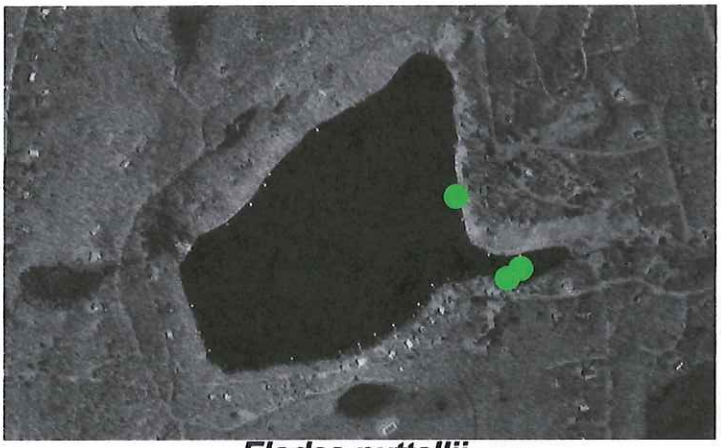
Elatine minima



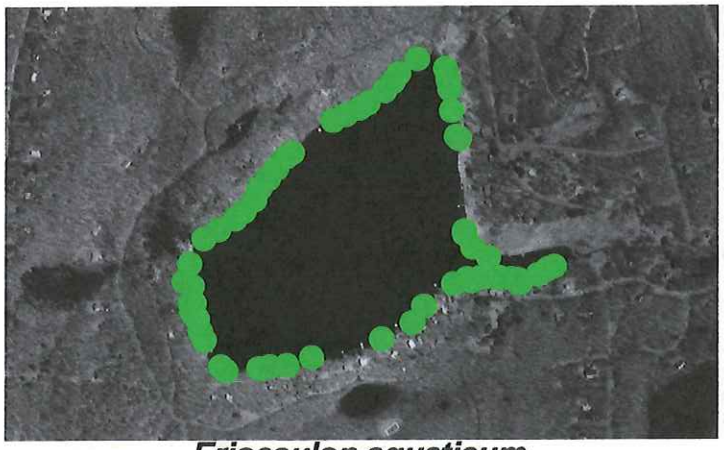
Eleocharis acicularis



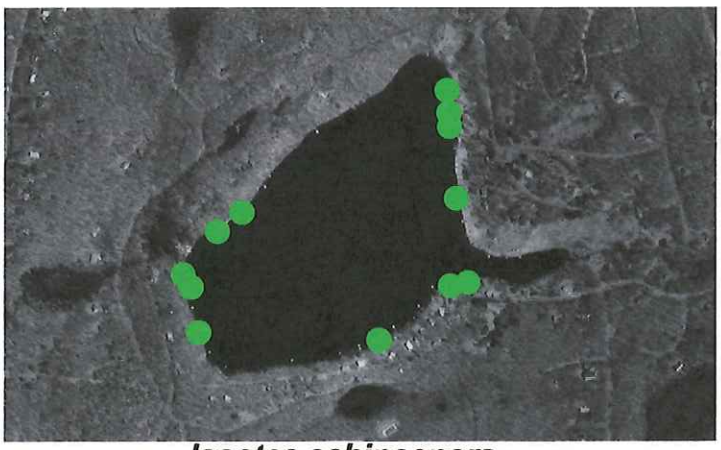
Eleocharis palustris



Elodea nuttallii

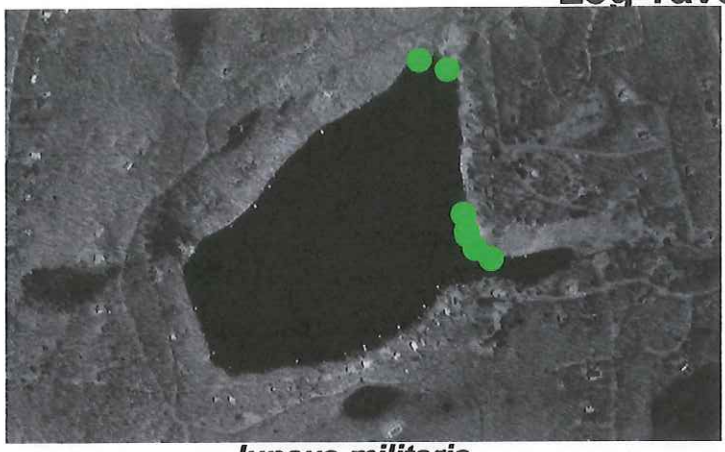


Eriocaulon aquaticum

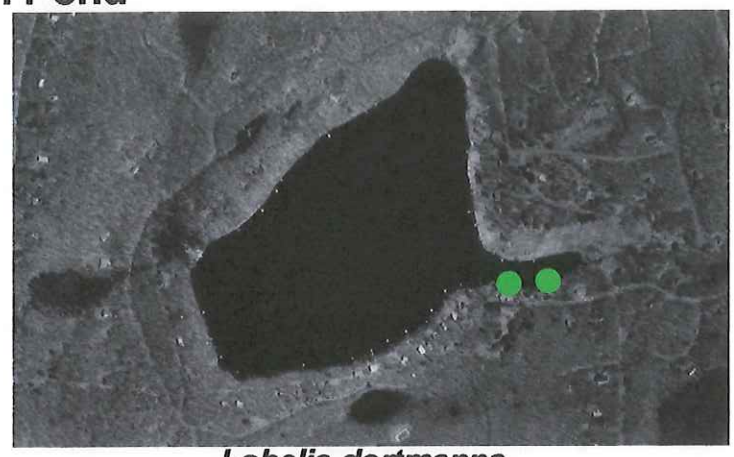


Isoetes echinospora

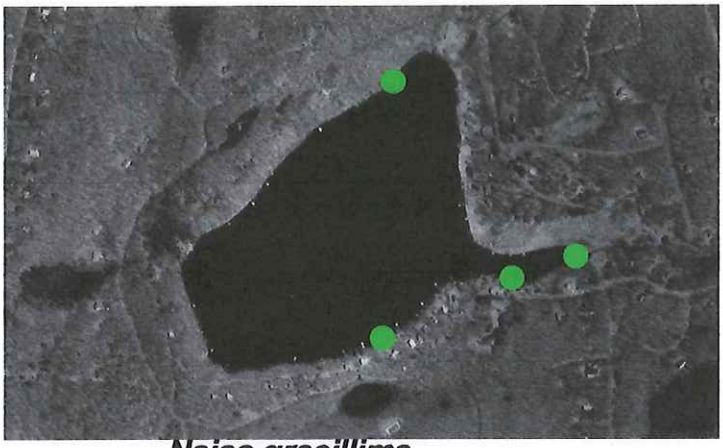
Log Tavern Pond



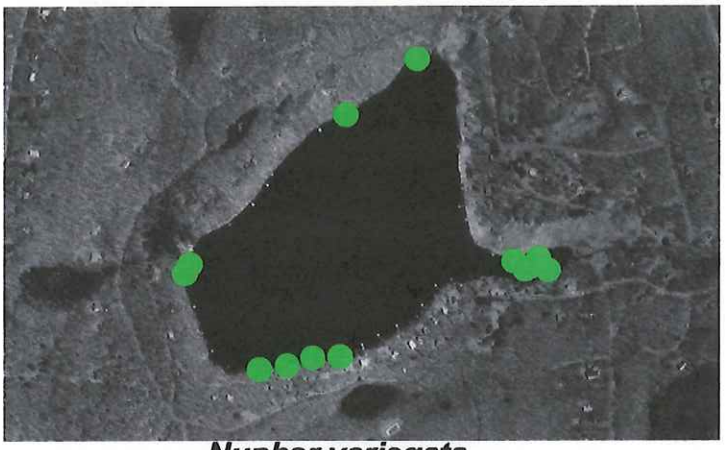
Juncus militaris



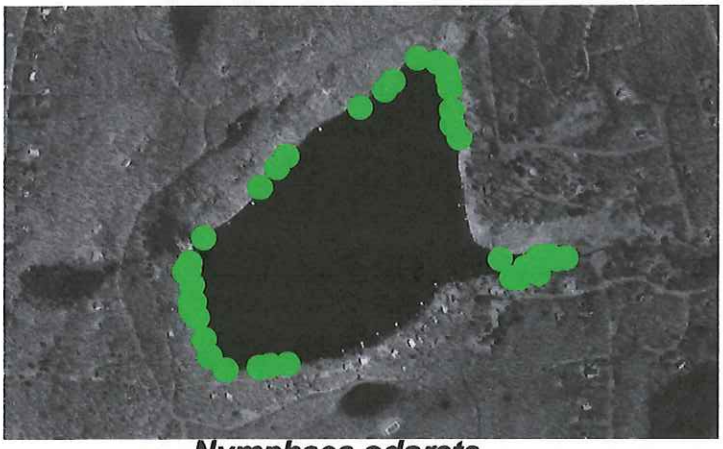
Lobelia dortmanna



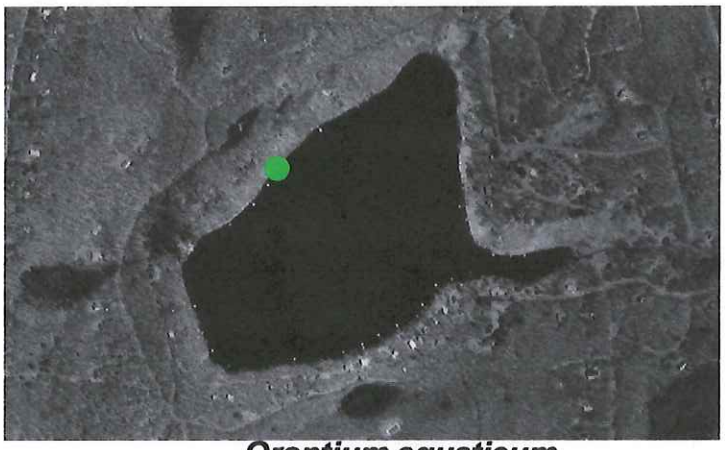
Najas gracillima



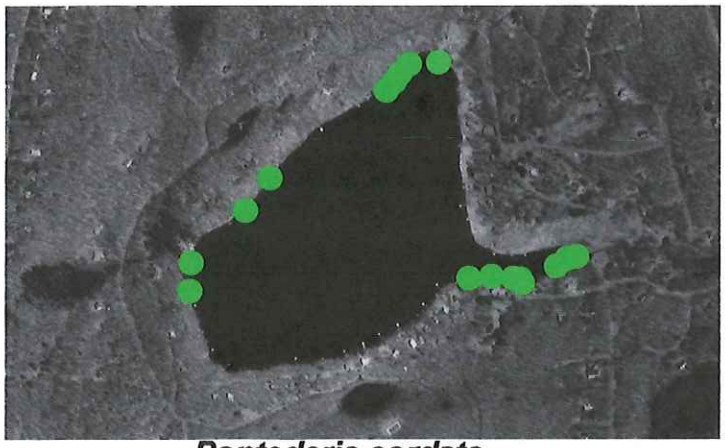
Nuphar variegata



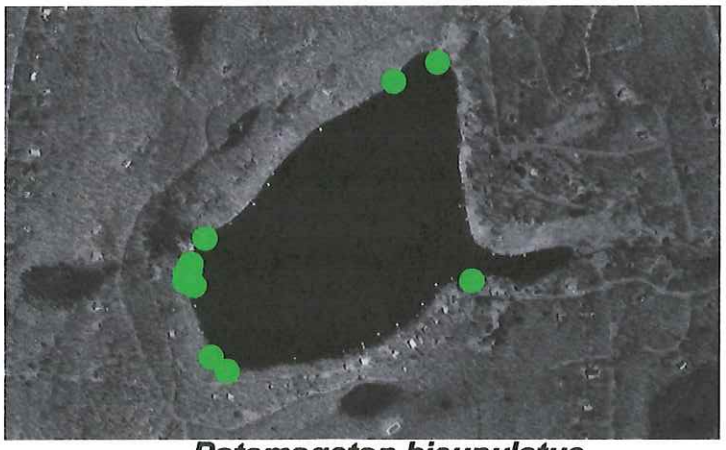
Nymphaea odorata



Orontium aquaticum

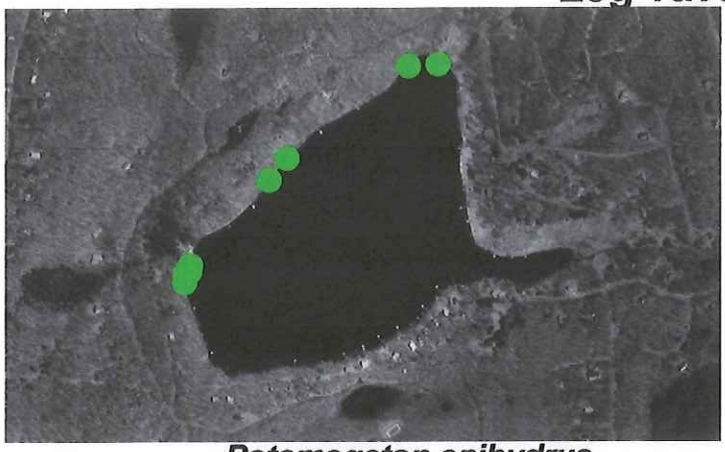


Pontederia cordata

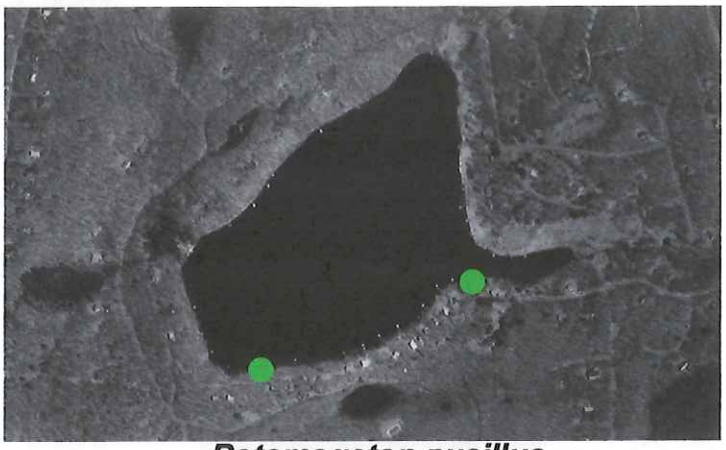


Potamogeton bicupulatus

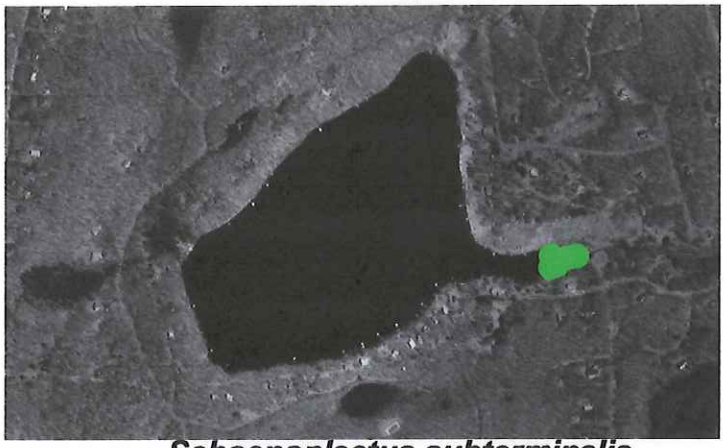
Log Tavern Pond



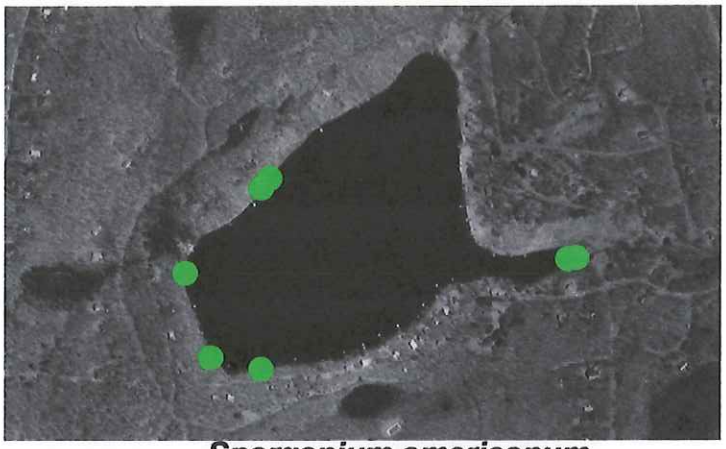
Potamogeton epihydrus



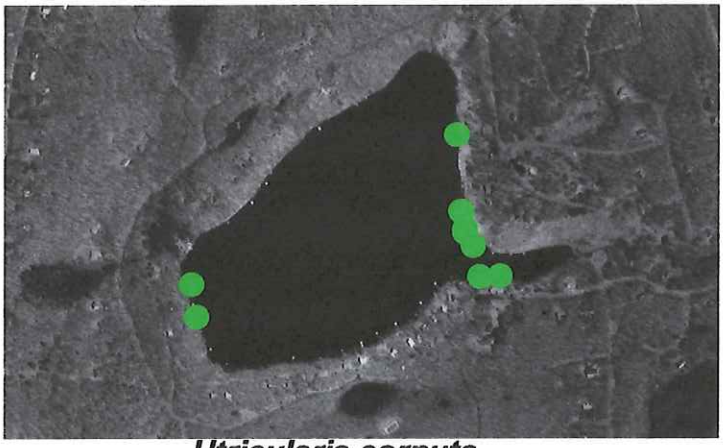
Potamogeton pusillus



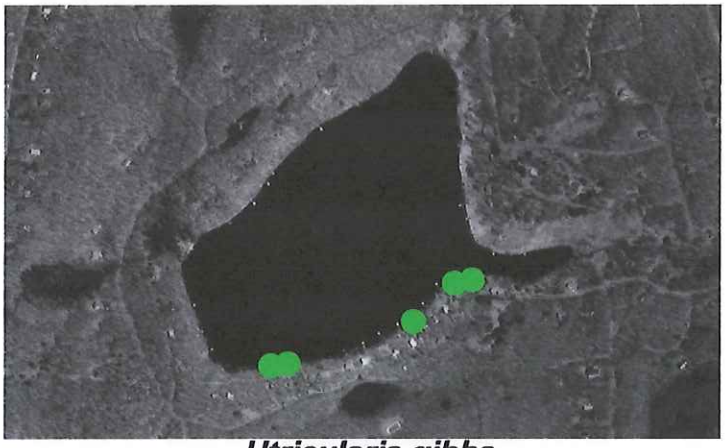
Schoenoplectus subterminalis



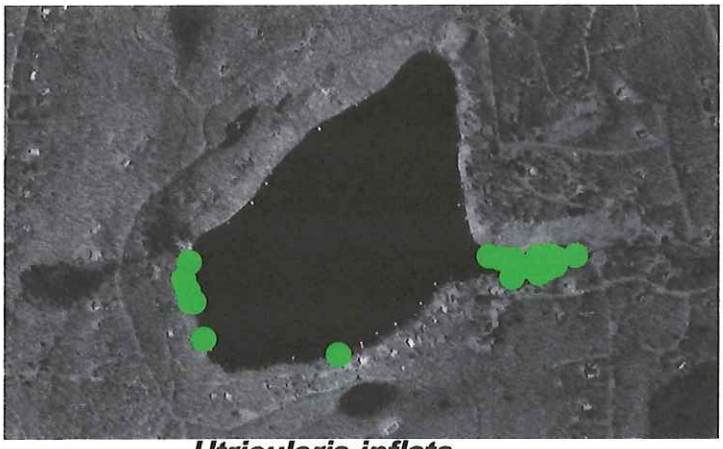
Sparganium americanum



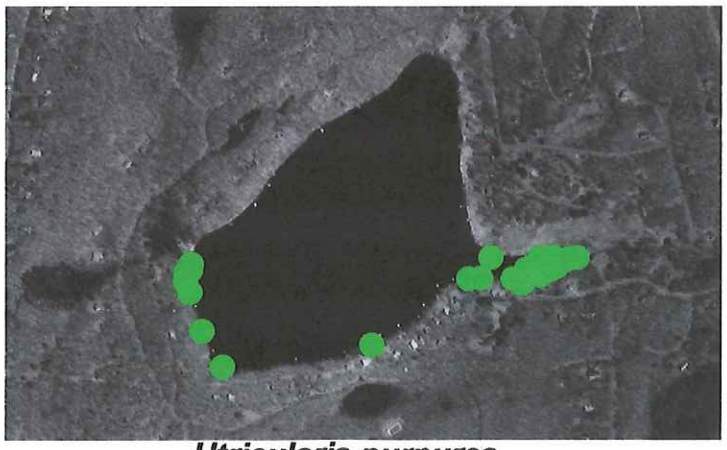
Utricularia cornuta



Utricularia gibba



Utricularia inflata



Utricularia purpurea

Marcel Lake

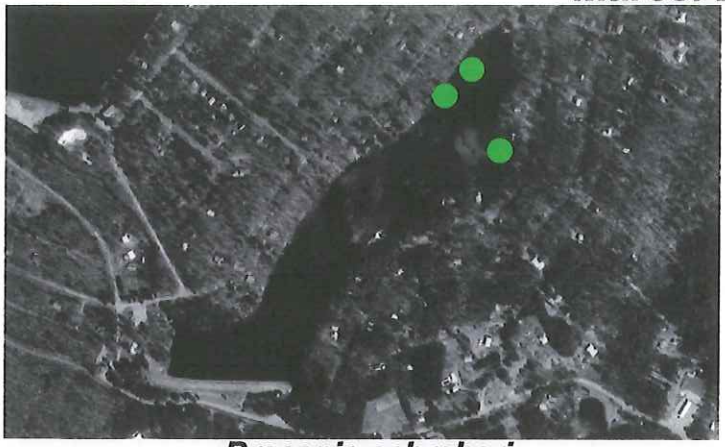
Dingman's Ferry, PA
Pike County, Pennsylvania
Ownership: two private lake associations
Contact: Tom Baker, resident

Latitude: 41.25571 deg. N
Longitude: 74.95433 deg. W
Quad: Edgemere
Surface area: 28 acres
Maximum depth: ca. 17 feet
Elevation: 1,231 feet above mean sea level
An impoundment, dam was constructed in the late 1940s or early 1950s according to DER

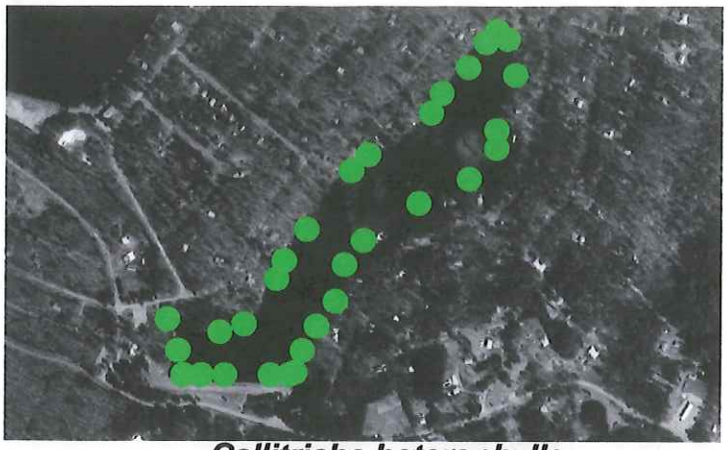
Date visited: July 29, 2004
Number of sampling points: 34
Number of aquatic macrophytes plants recorded: 21, number mapped: 18
PNHP-listed species present: none

Comments:
The most abundant plants were *Fontanalis sullivantii, Potamogeton epihydrus*, and *Elatine triandra*. Residents have been mechanically removing *Nymphaea odorata* and *Brasenia schreberi*. *Elodea nuttallii, Ceratophyllum echinatum* (syn. *C. muricatum*), and *Myriophyllum humile* were all present by nowhere abundant.

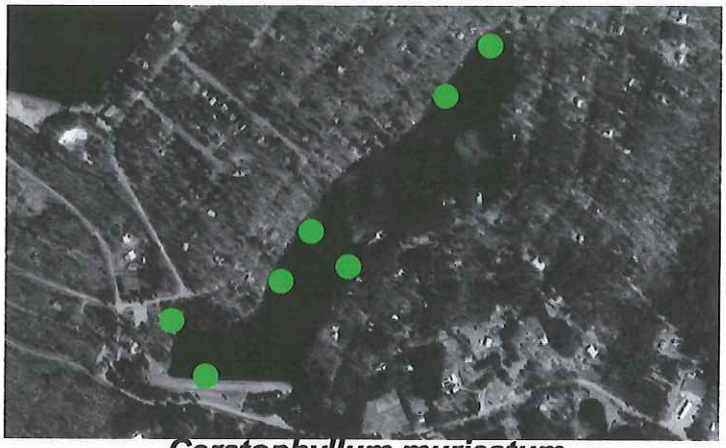
Marcel Lake



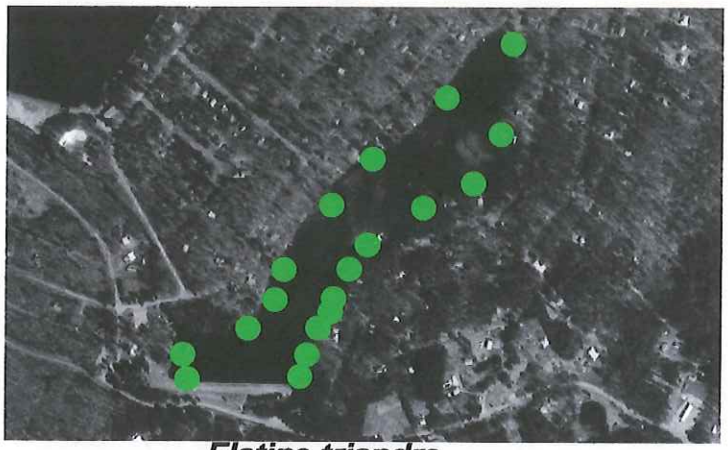
Brasenia schreberi



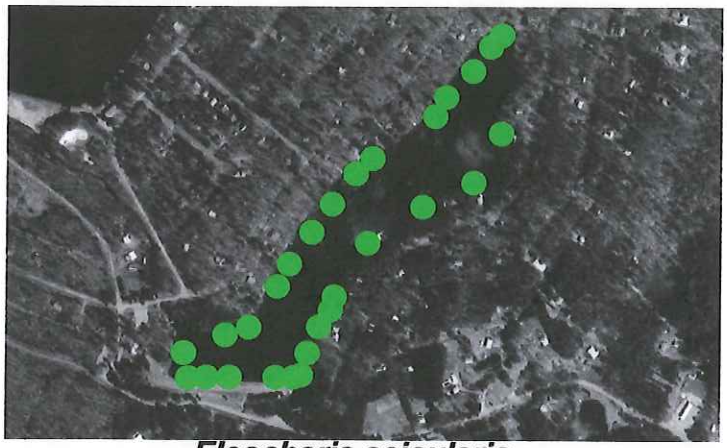
Callitriche heterophylla



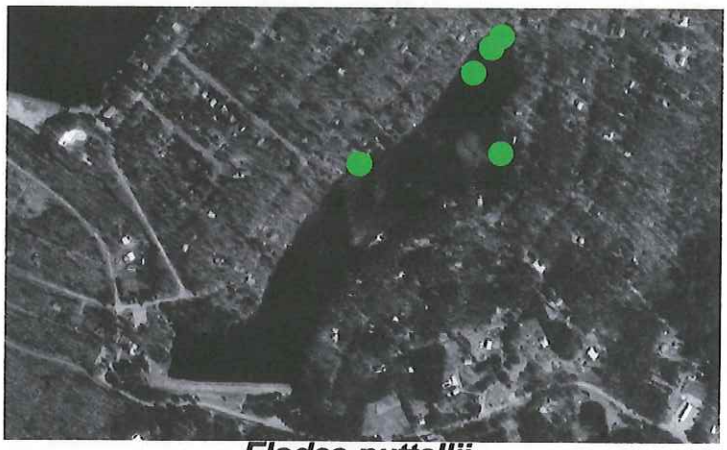
Ceratophyllum muricatum



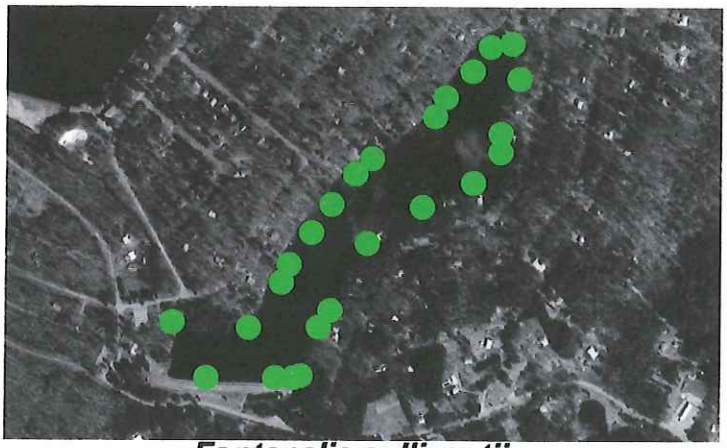
Elatine triandra



Eleocharis acicularis



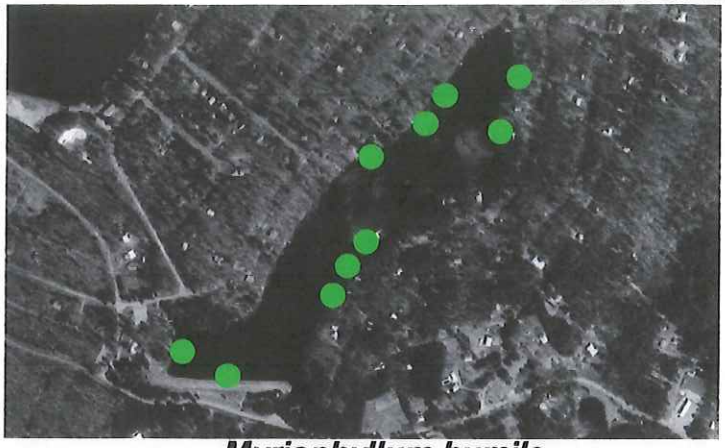
Elodea nuttallii



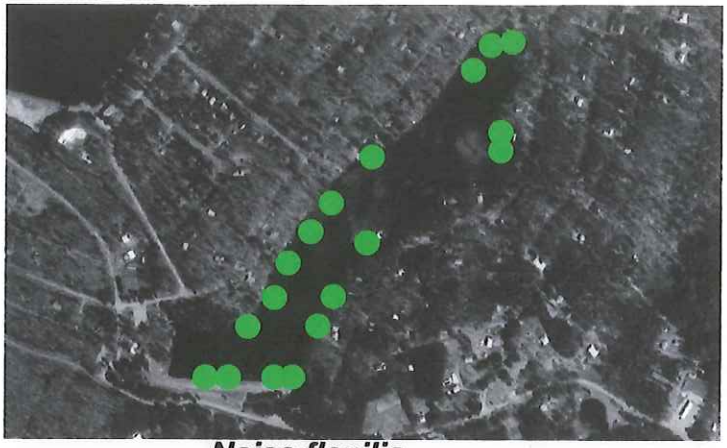
Fontanalis sullivantii

Ludwigia palustris

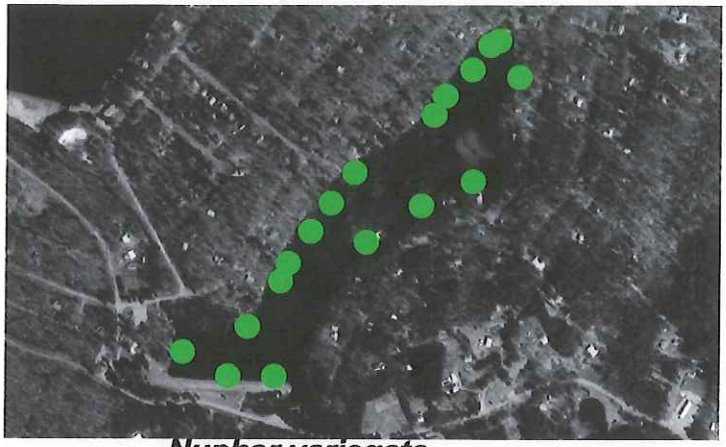
Marcel Lake



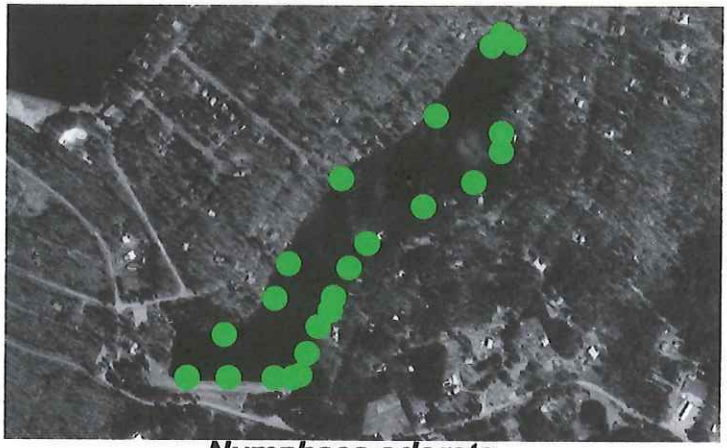
Myriophyllum humile



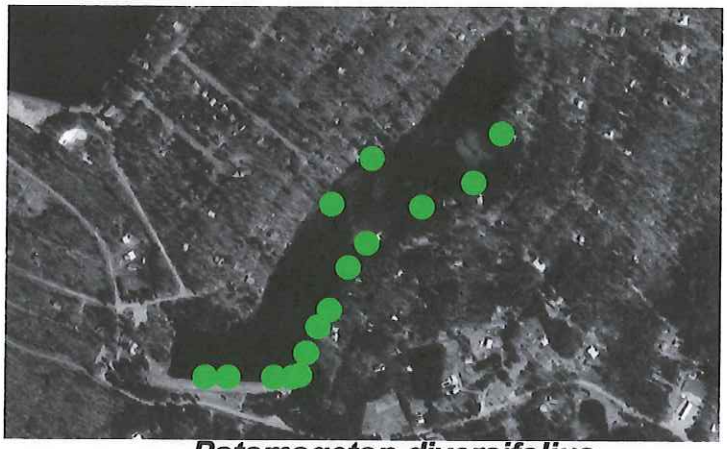
Najas flexilis



Nuphar variegata

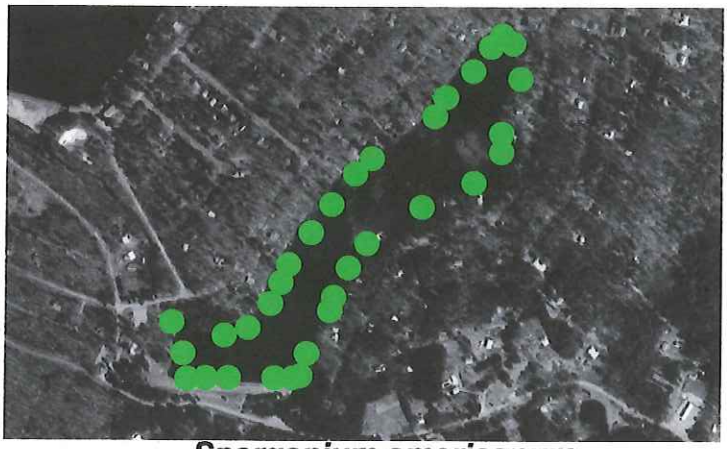


Nymphaea odorata

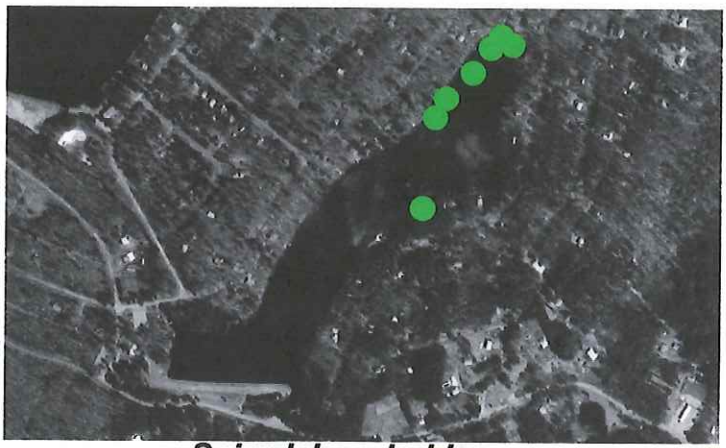


Potamogeton diversifolius

Potamogeton epihydrus



Sparganium americanum



Spirodela polyrhiza

Marcel Lake

Typha latifolia

Utricularia macrorhiza

Mud Pond

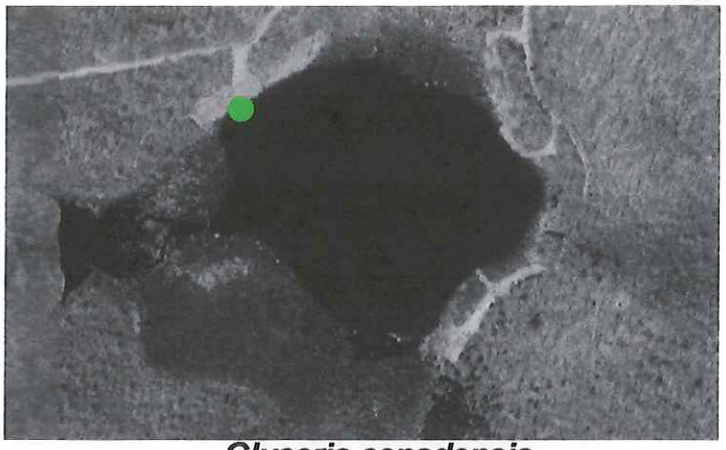
Pleasant View Summit, PA
Luzerne County, Pennsylvania
Ownership: Pennsylvania Game Commission (State Game Lands 91)
Contact: Pat Grimes, Pennsylvania Game Commission Maintenance Facility at Pleasant View Summit

Latitude: 41.2249 deg. N
Longitude: 75.68004 deg. W
Quad: Pleasant View Summit
Surface area: 13.8 acres
Maximum depth:
Average depth; ca. 2 feet
Elevation: 2,021 feet above mean sea level
A shallow natural glacial lake with a beaver dam at the outlet

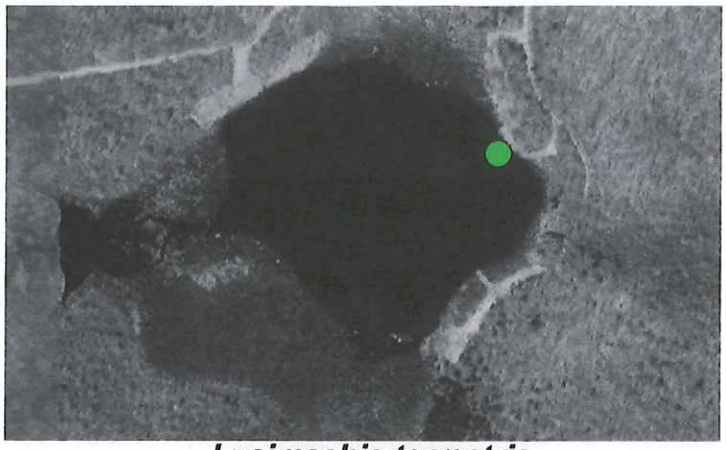
Date visited: August 10, 2004
Number of sampling points: 16
Number of aquatic macrophytes plants recorded: 33, number mapped: 7
PNHP-listed species present:
Schoenoplectus subterminalis

Comments:
This is a shallow natural lake with beaver activity. Most of the water surface is covered by *Nymphaea odorata*. *Schoenoplectus subterminalis* is also abundant. Boggy islands are present on the south side.

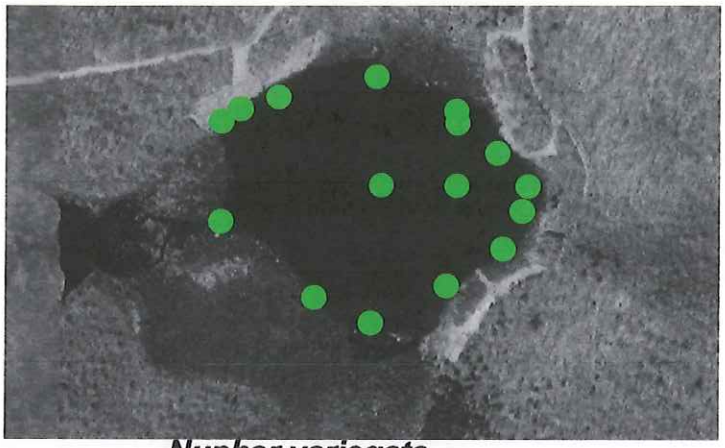
Mud Pond



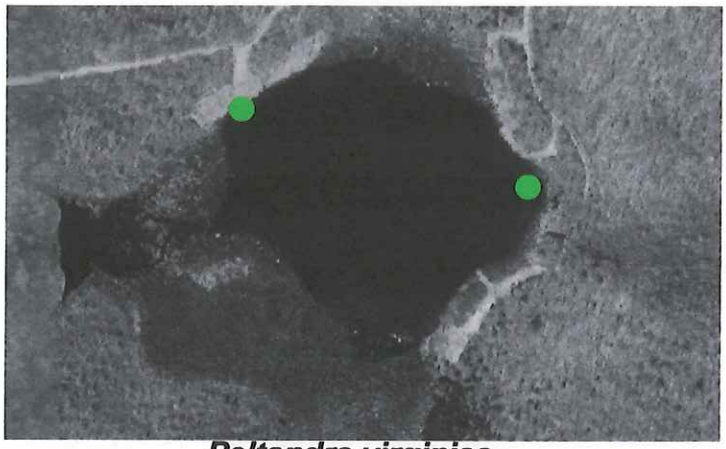
Glyceria canadensis



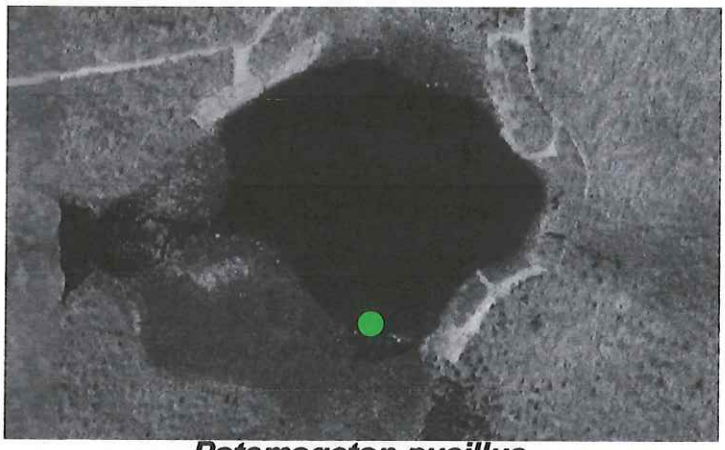
Lysimachia terrestris



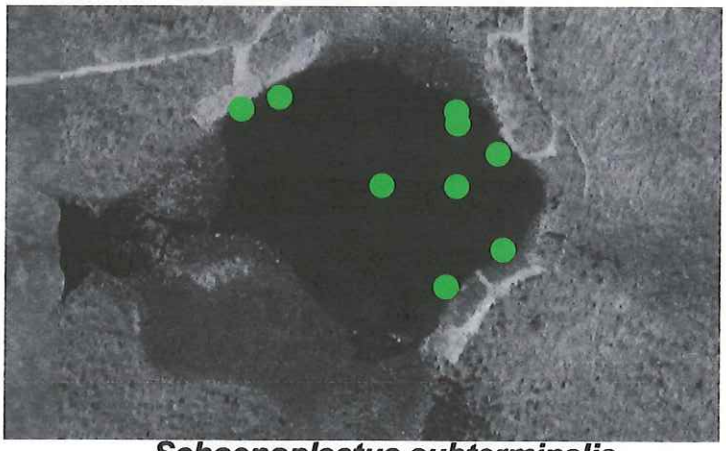
Nuphar variegata



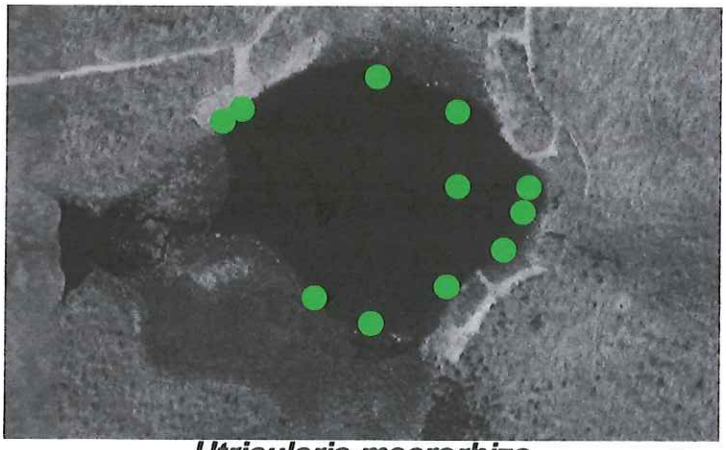
Peltandra virginica



Potamogeton pusillus



Schoenoplectus subterminalis



Utricularia macrorhiza

Silver Lake

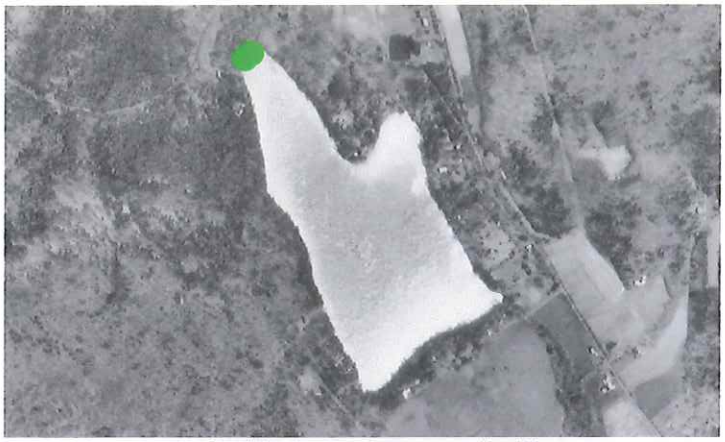
Brackney, PA
Susquehanna County, Pennsylvania
Ownership: private lake owners association
Contact: Bill Fischer, resident

Latitude: 41.93482 deg. N
Longitude: 75.95249 deg. W
Quad: Laurel Lake
Surface area: 92 acres
Maximum depth: 110 feet
Elevation: 1,699 feet above mean sea level
Natural glacial lake

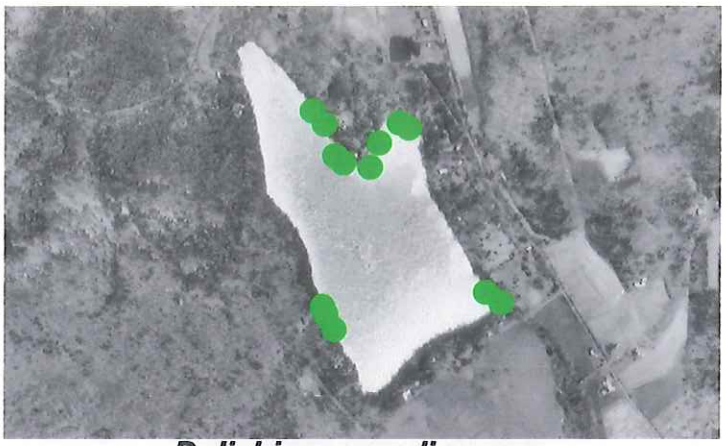
Date visited: July 26, 2004
Number of sampling points: 40
Number of aquatic macrophytes plants recorded: 26, number mapped: 22
PNHP-listed species present: none

Comments:
Water was very clear, had a deep green hue where very deep. Extensive aquatic beds consisting of *Potamogeton spirillus, P. pusillus, Najas flexilis*, and *Nitella* and *Chara* were present in water 5—8 feet deep. *Sagittaria rigida* rosettes formed dense stands in water 4—5 feet deep. *Isoetes* sp. and *Eleocharis acicularis* were also abundant. *Isoetes engelmannii, Isoetes echinospora* and a putative hybrid with collapsed spores were all present.

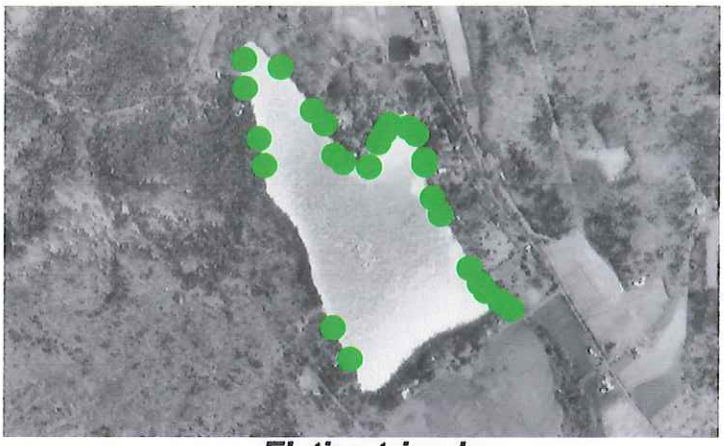
Silver Lake



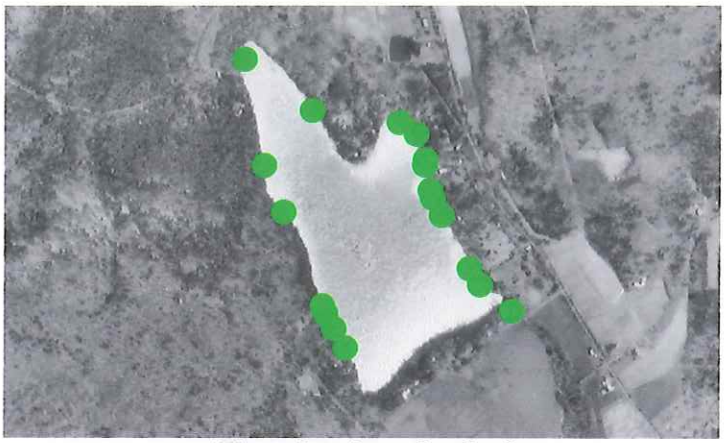
Callitriche heterophylla



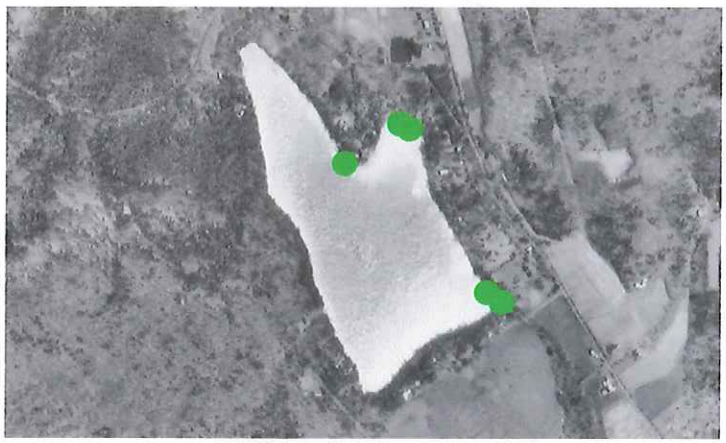
Dulichium arundinaceum



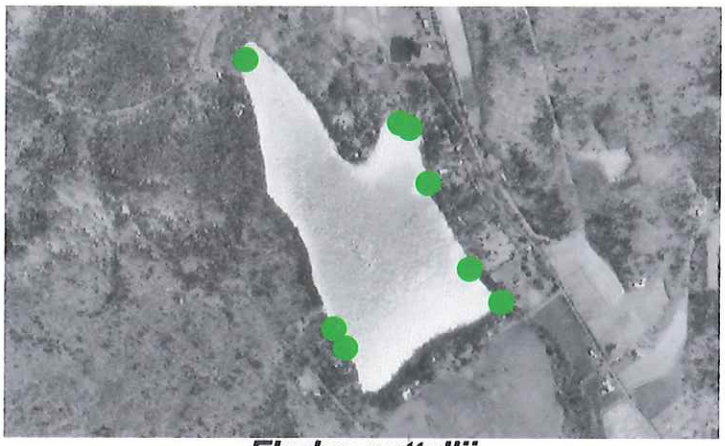
Elatine triandra



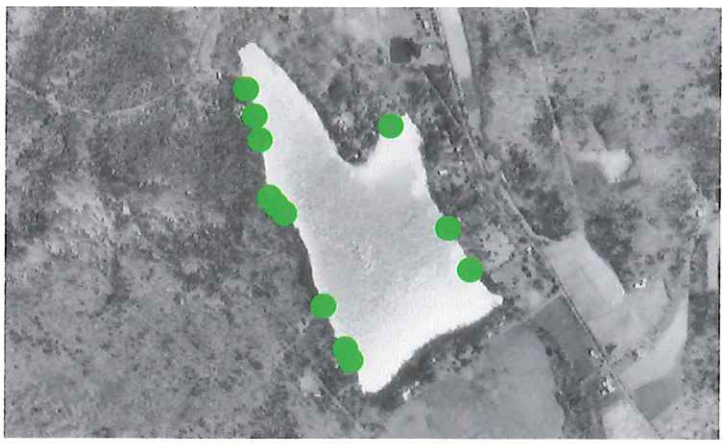
Eleocharis acicularis



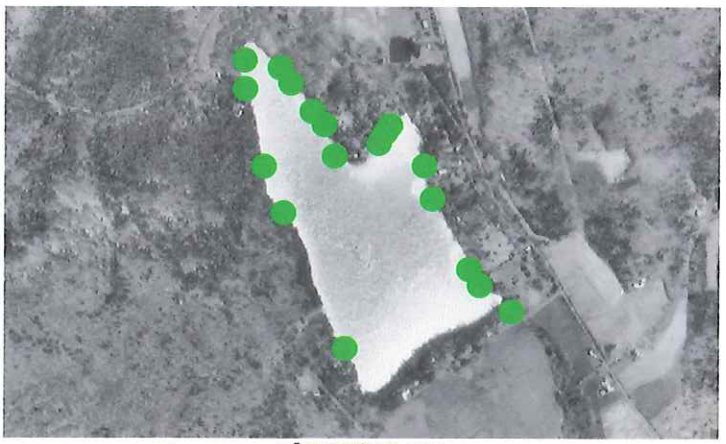
Eleocharis palustris



Elodea nuttallii

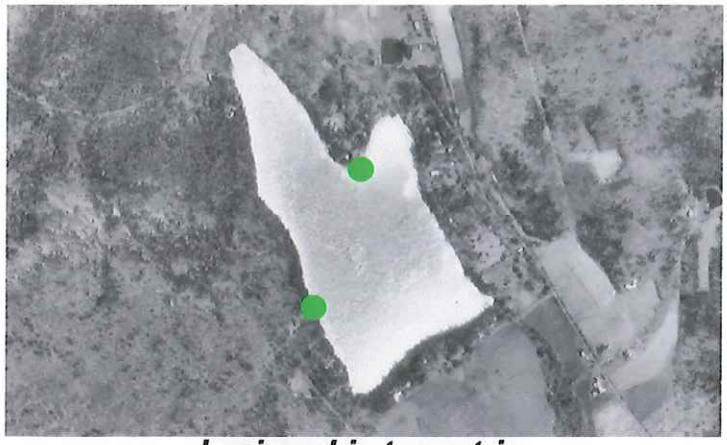


Fontanalis sullivantii

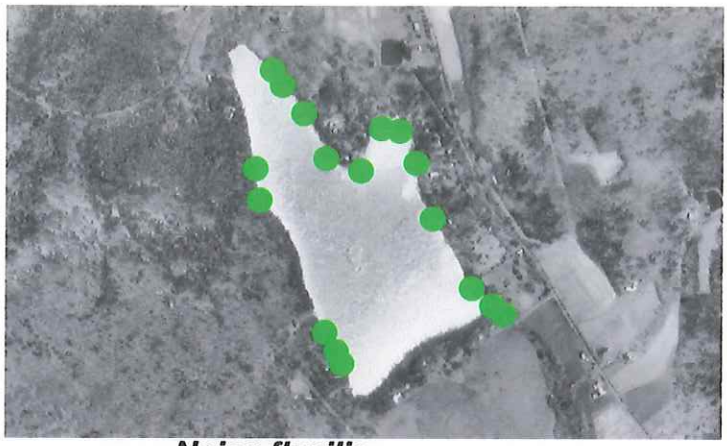


Isoetes sp.

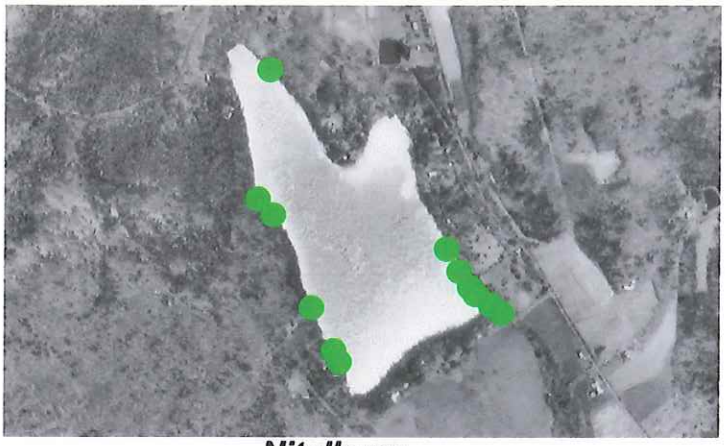
Silver Lake



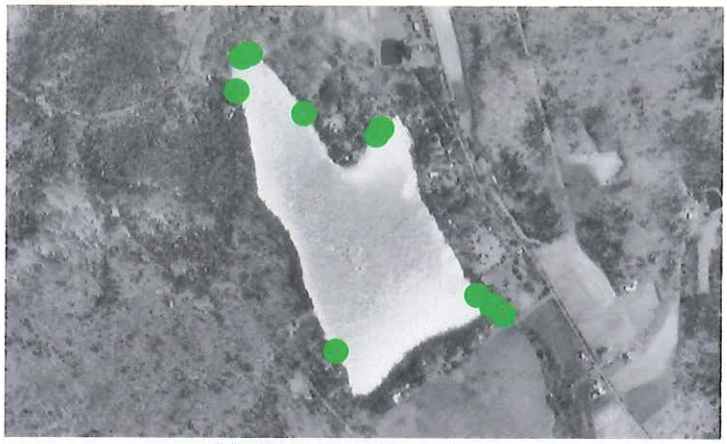
Lysimachia terrestris



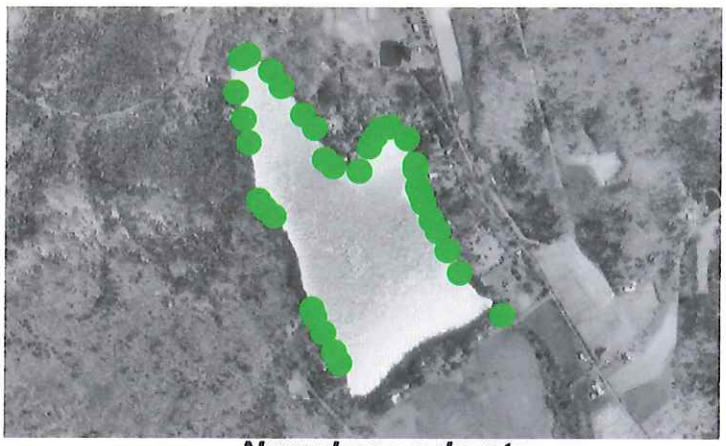
Najas flexilis



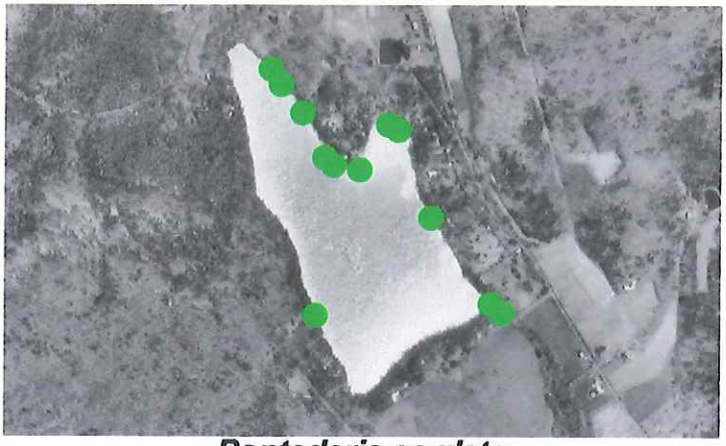
Nitella sp.



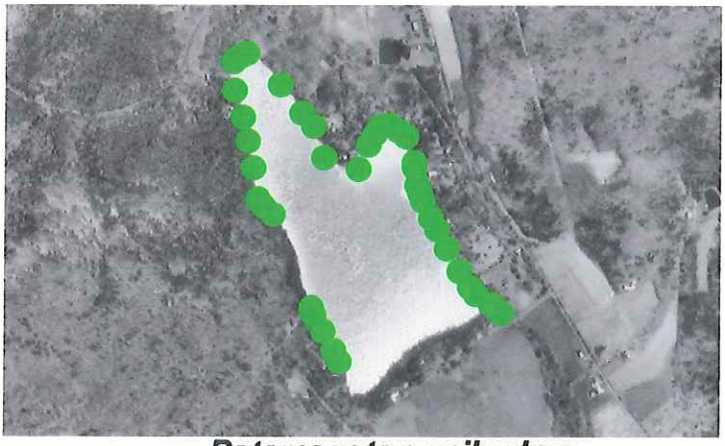
Nuphar variegata



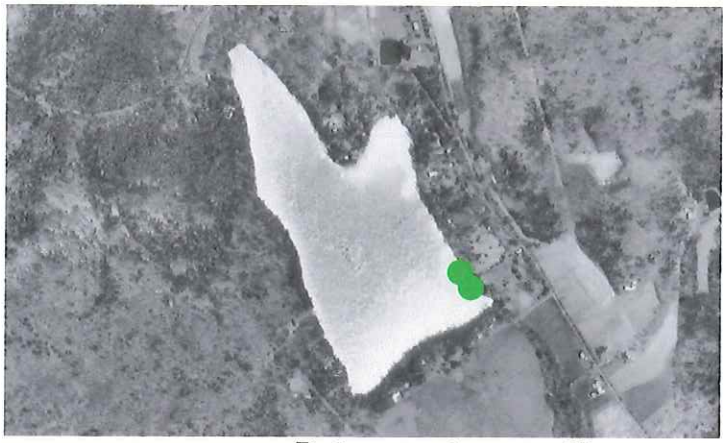
Nymphaea odorata



Pontederia cordata

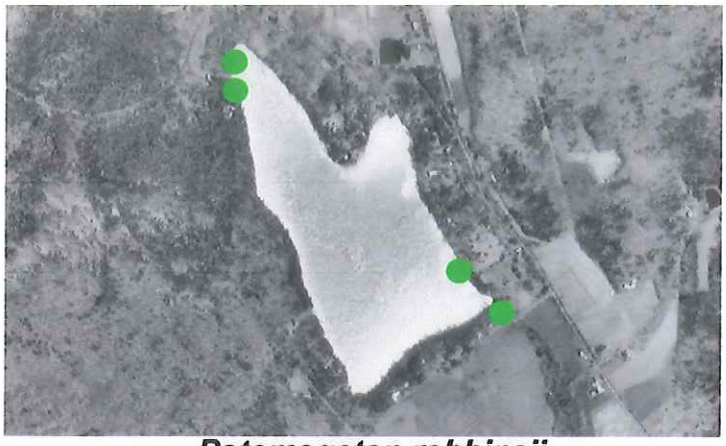


Potamogeton epihydrus

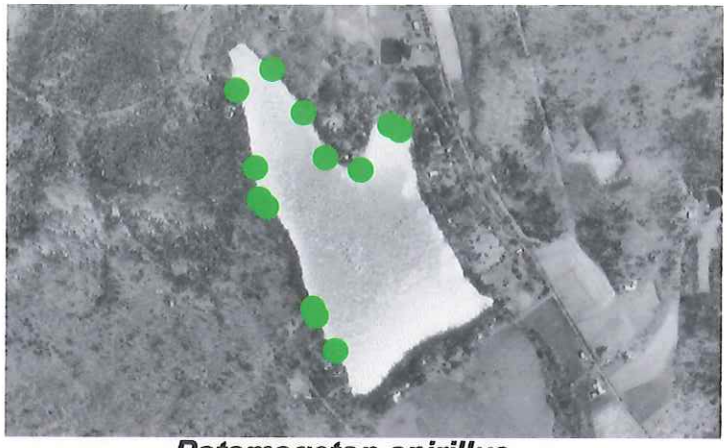


Potamogeton pusillus

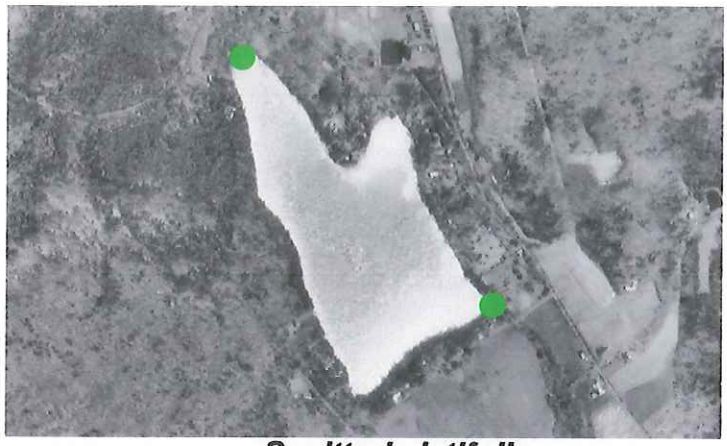
Silver Lake



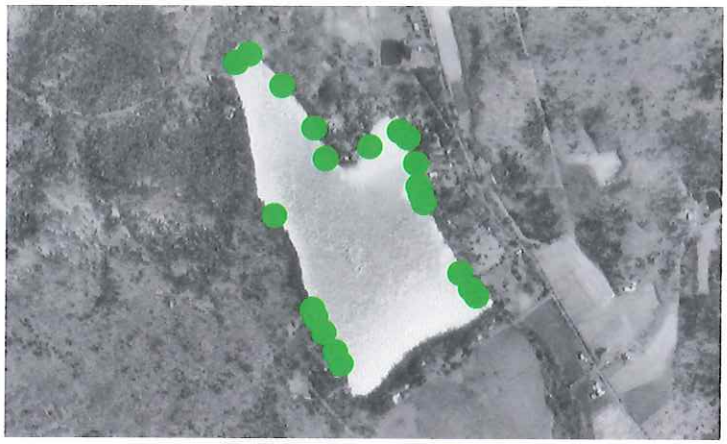
Potamogeton robbinsii



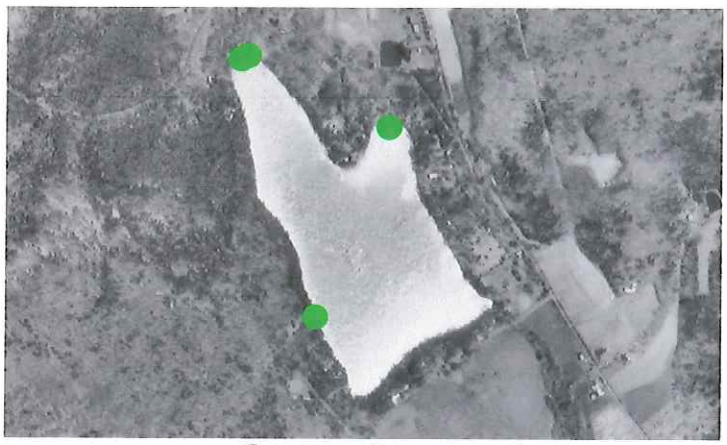
Potamogeton spirillus



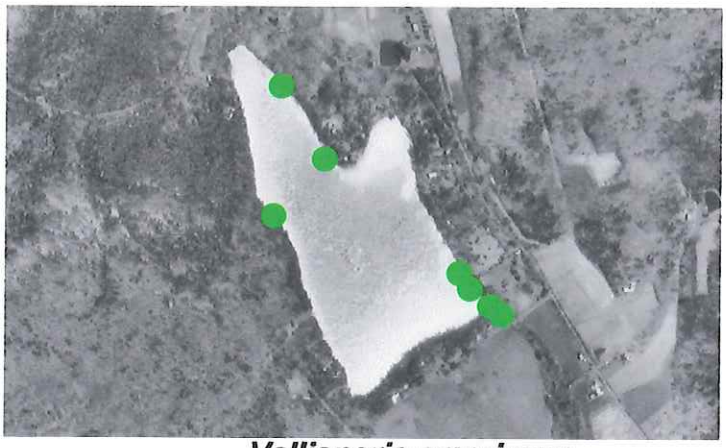
Sagittaria latifolia



Sagittaria rigida



Sparganium americanum



Vallisneria americana

Spruce Lake

Preston Center, PA
Wayne County, Pennsylvania
Ownership: private lake owners association
Contact: Miles Krieger, resident

Latitude: 41.84198 deg. N
Longitude: 75.42432 deg. W
Quad: Orson
Surface area: 88.5 acres
Maximum depth:
Elevation: 2,018 feet above mean sea level
Natural lake with beaver dam at outlet

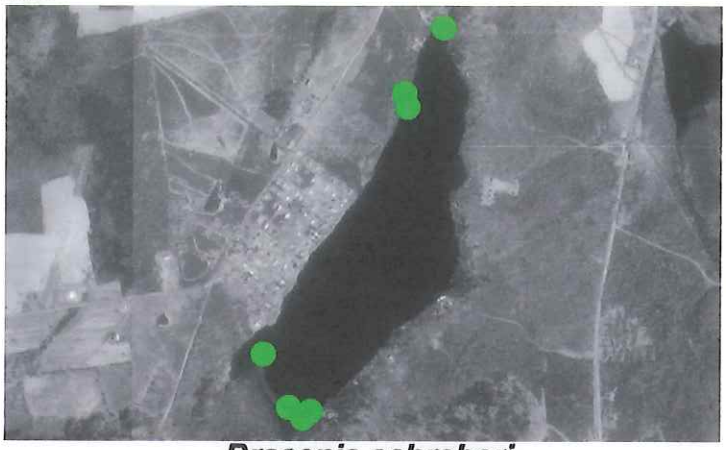
Date visited: July 6, 2004
Number of sampling points: 39
Number of aquatic macrophytes plants recorded: 62, number mapped: 27
PNHP-listed species present:

Andromeda polifolia
Carex lasiocarpa var. *lasiocarpa*
Cladium mariscoides

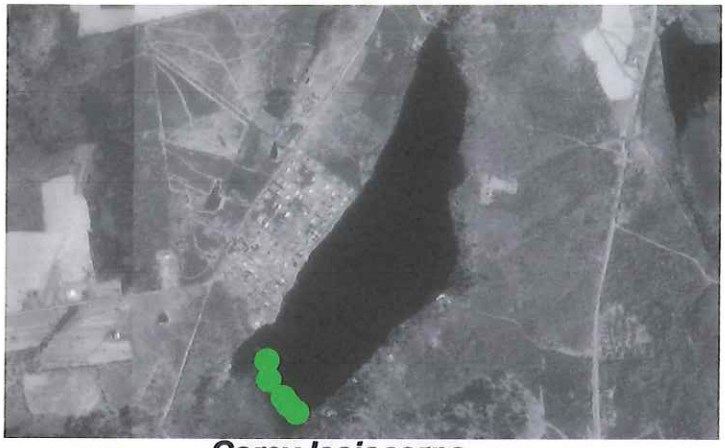
Comments:
Spruce Lake appears to be a very oligotropic lake; bottom is hard sand with little or no accumulation of organic matter except at the south end where boggy islands are present. Beaver activity is very evident; the water level appears to have been almost a foot higher at some time in the recent past. Submergent vegetation was very sparse overall. Floating-leaf species were represented by scattered *Nuphar* and a few *Brasenia*; there was no *Nymphaea* present.

Spruce Lake

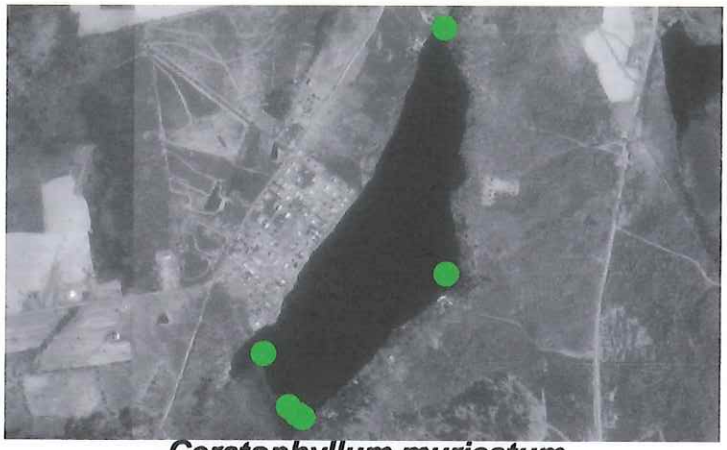
Andromeda polifolia



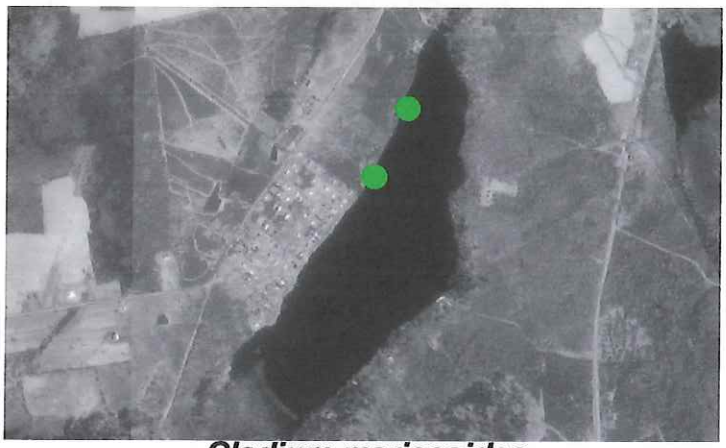
Brasenia schreberi



Carex lasiocarpa

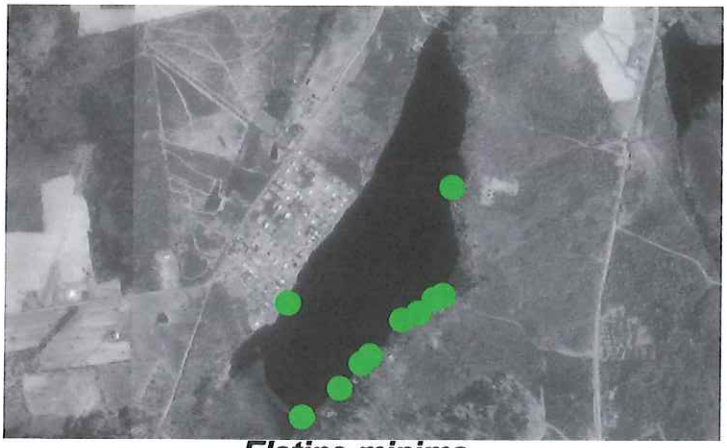


Ceratophyllum muricatum

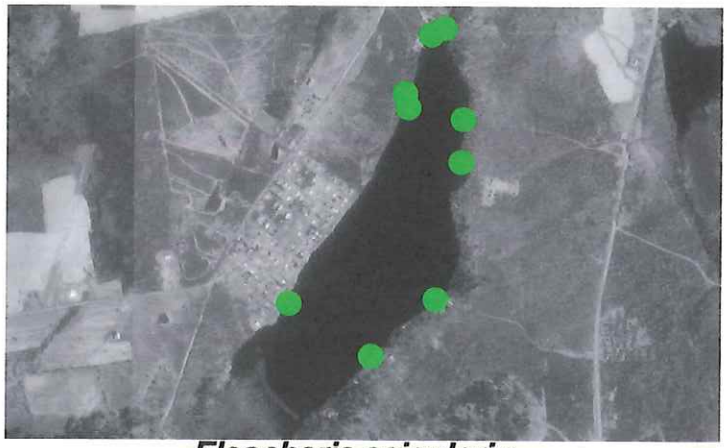


Cladium mariscoides

Dulichium arundinaceum

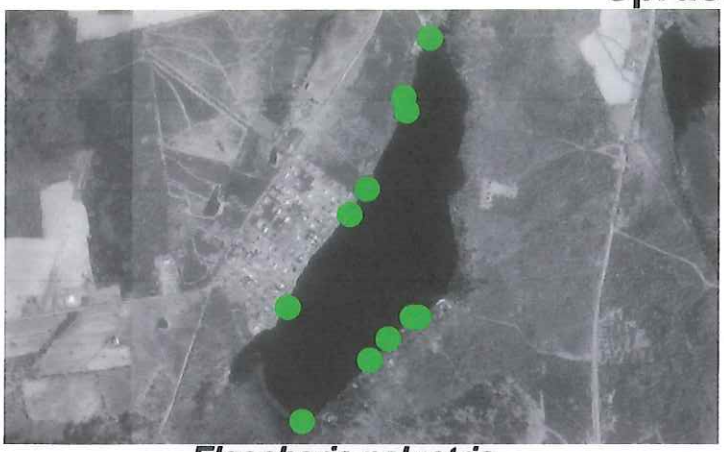


Elatine minima

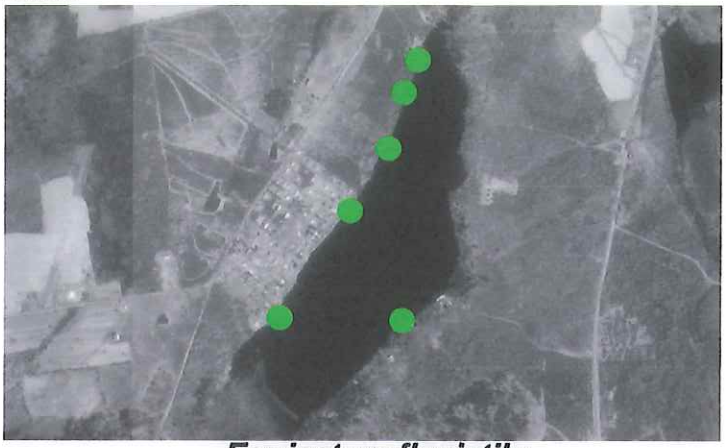


Eleocharis acicularis

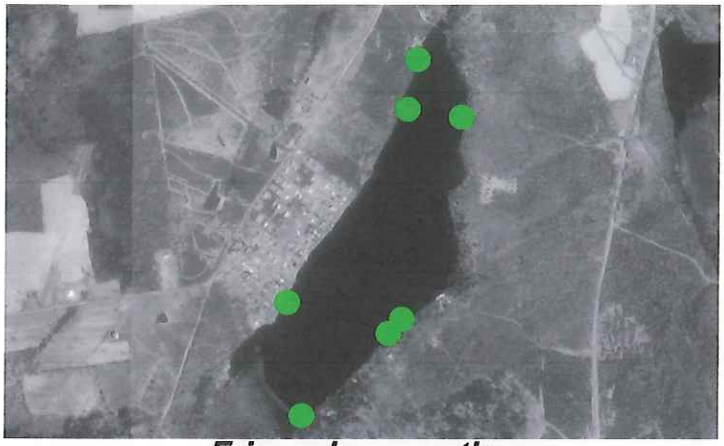
Spruce Lake



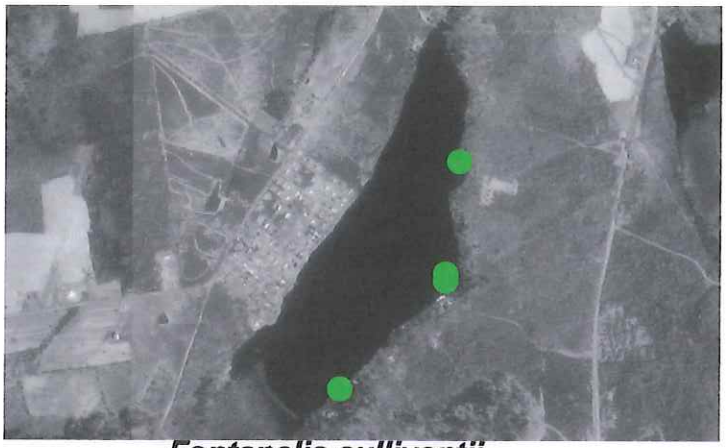
Eleocharis palustris



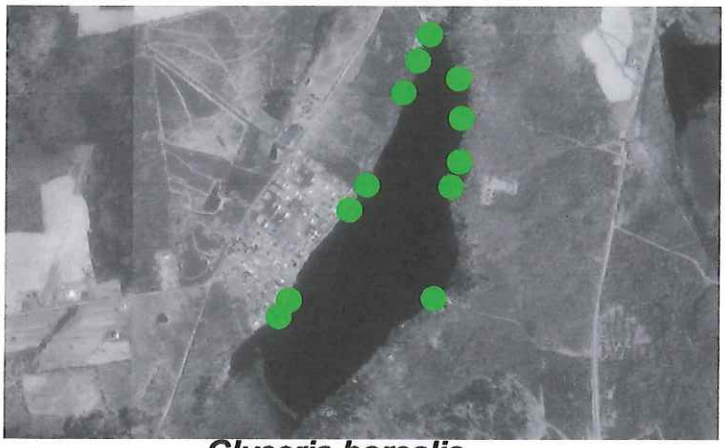
Equisetum fluviatile



Eriocaulon aquaticum



Fontanalis sullivantii



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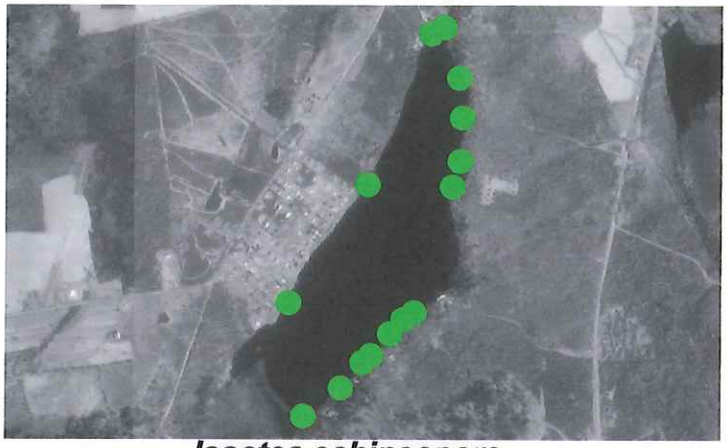
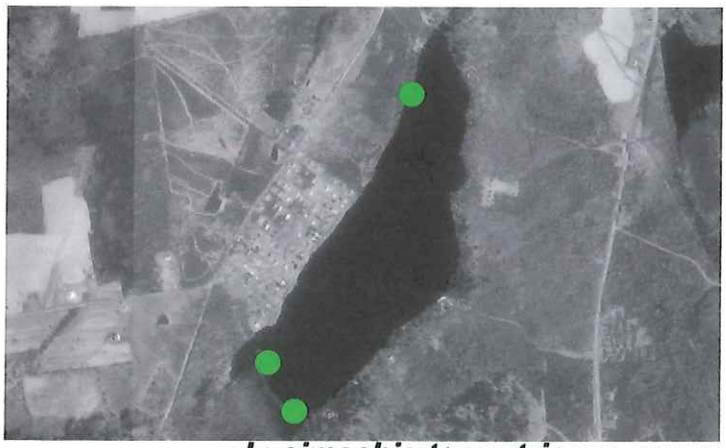
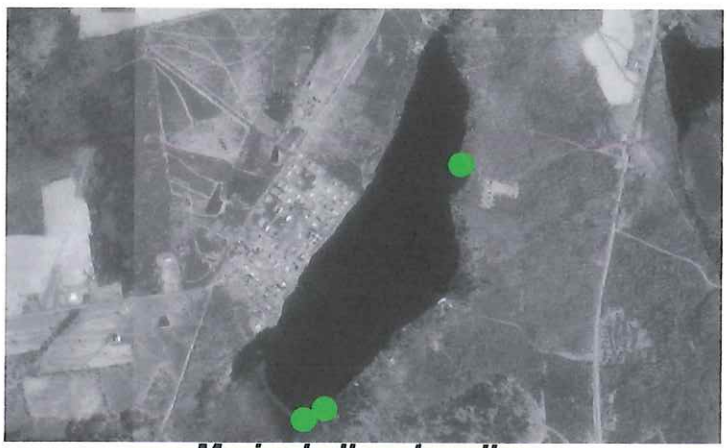


Isoetes echinospora

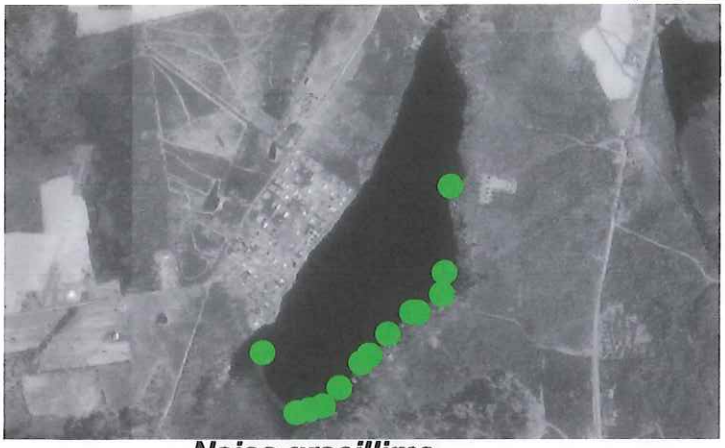


Lysimachia terrestris

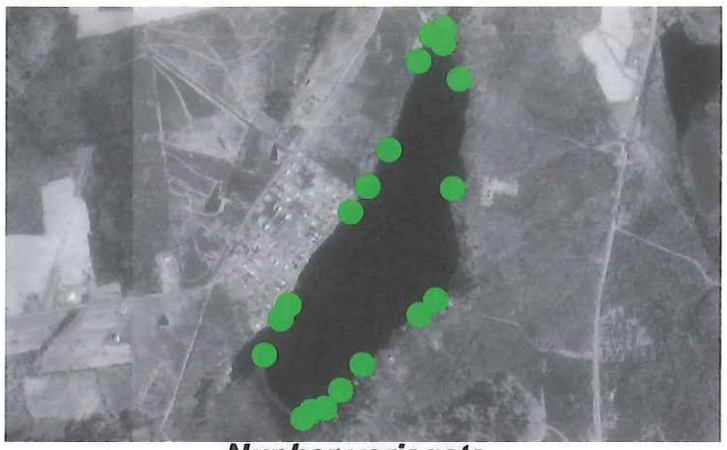


Myriophyllum humile

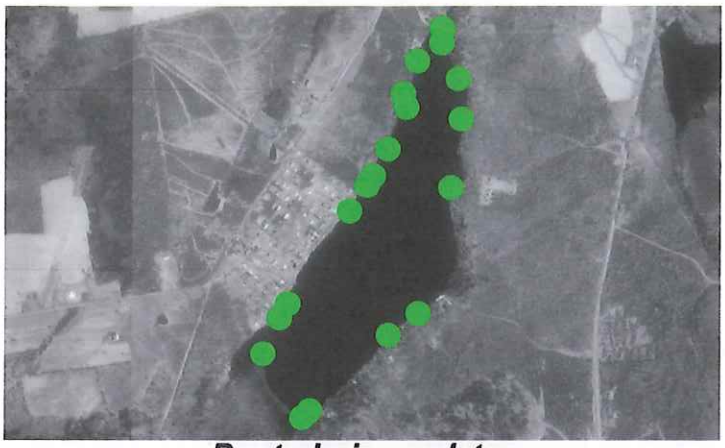
Spruce Lake



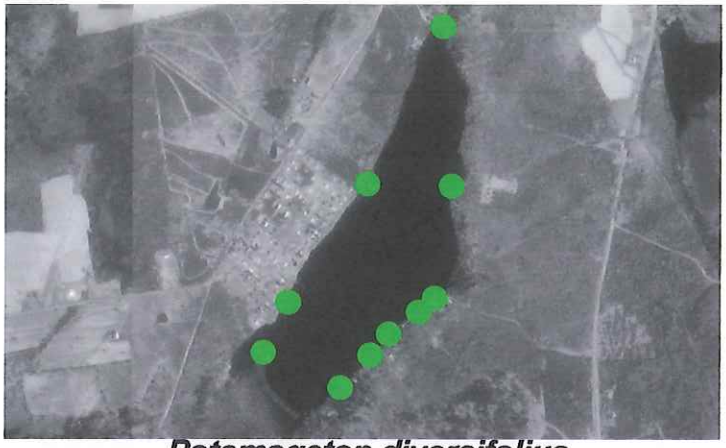
Najas gracillima



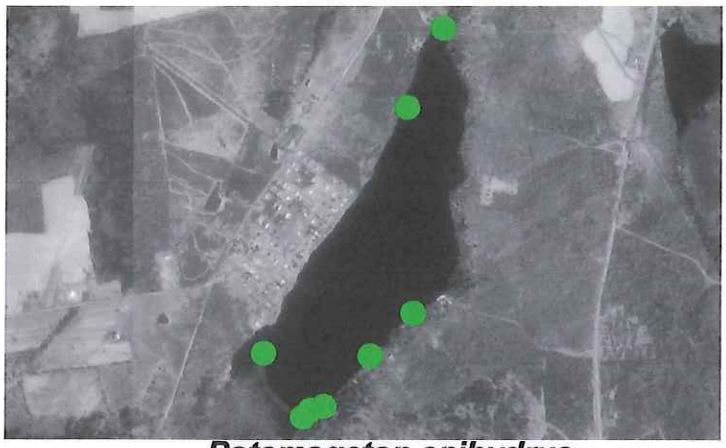
Nuphar variegata



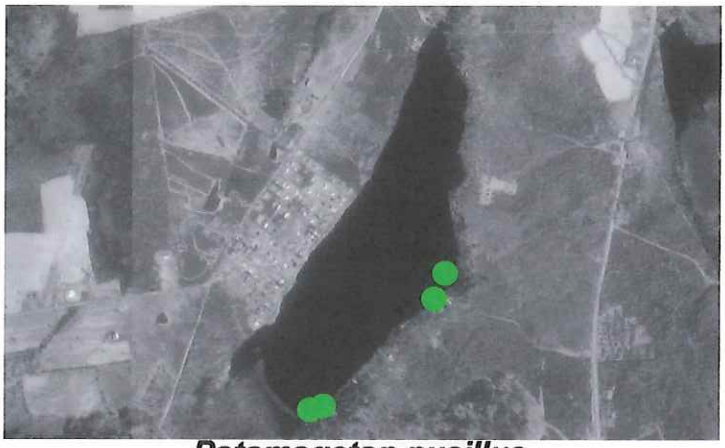
Pontederia cordata



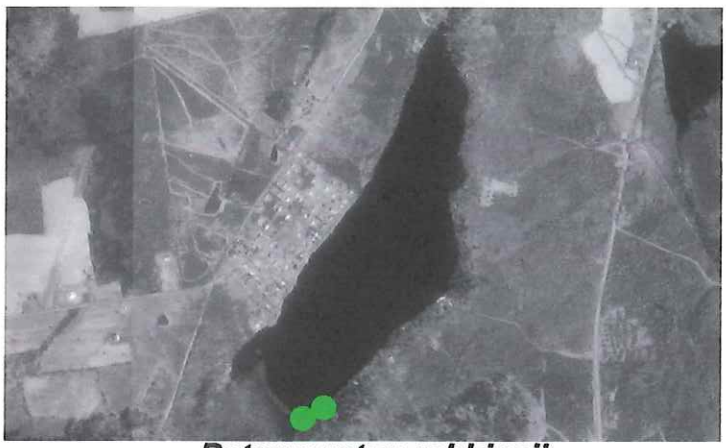
Potamogeton diversifolius



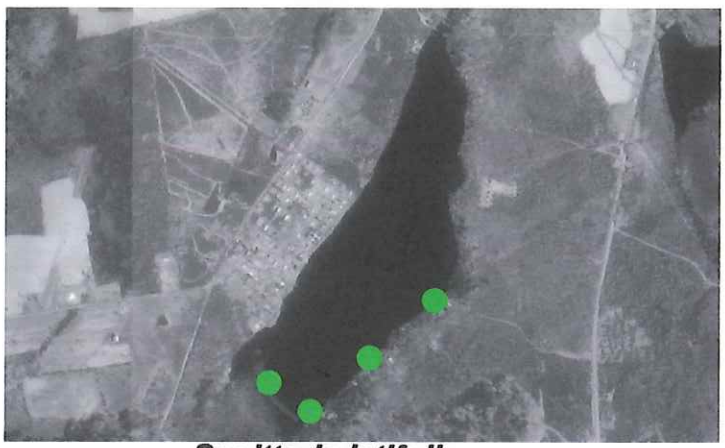
Potamogeton epihydrus



Potamogeton pusillus

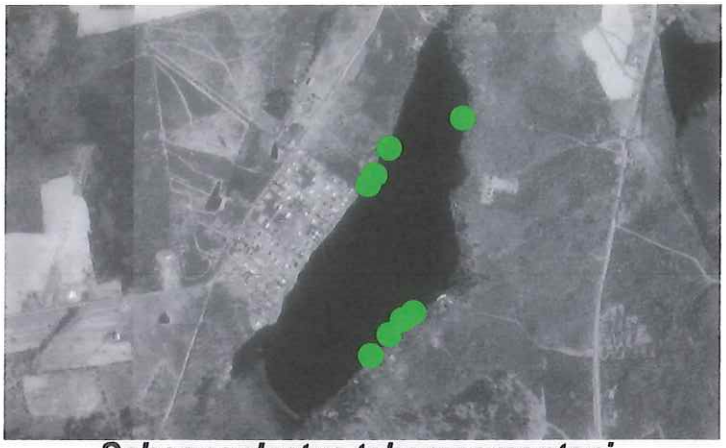


Potamogeton robbinsii

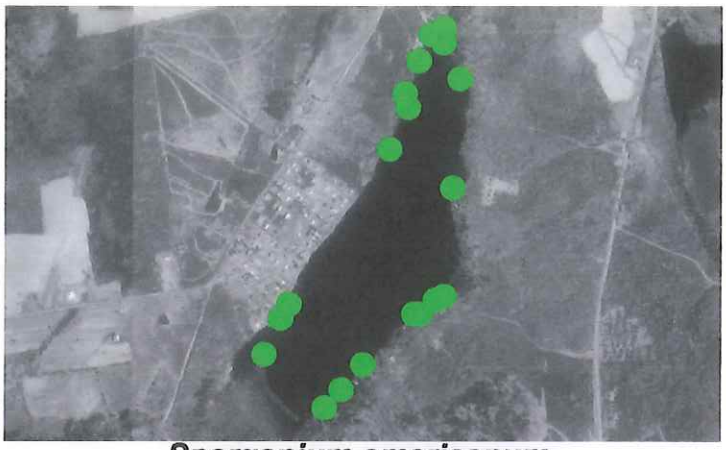


Sagittaria latifolia

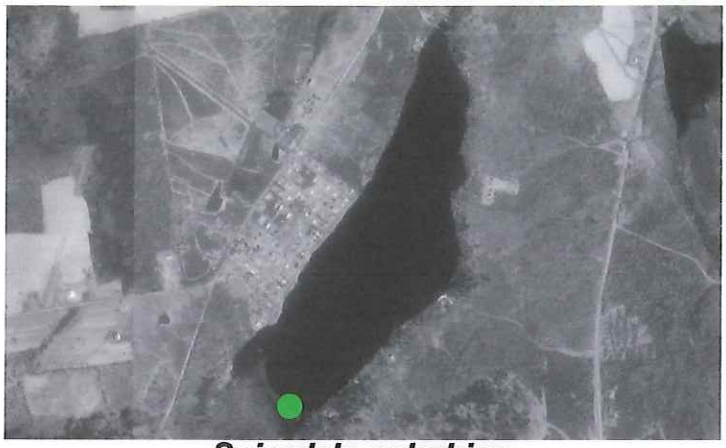
Spruce Lake



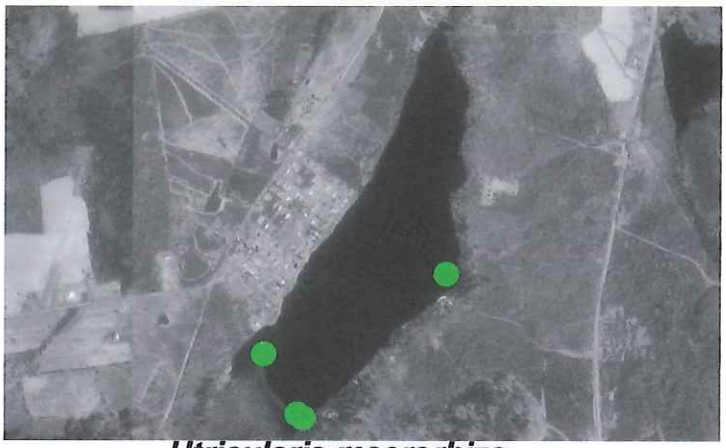
Schoenoplectus tabernaemontani



Sparganium americanum



Spirodela polyrhiza



Utricularia macrorhiza

Aquatic Plant Workshops

We conducted three hands-on workshops in conjunction with the Bureau of Forestry District 19, Lake Paupac Association, and the Pennsylvania Institute for Conservation Education (PICE). The purpose of the workshops was to acquaint Pocono area residents and natural resource managers with the diversity and ecological role of native aquatic vegetation and enlist them in monitoring for non-native invasive species. We also met with lake community residents at many of the lakes where we conducted surveys.

Additional Field Surveys

Additional field surveys were carried out in Bucks, Montgomery, Northampton, and Carbon Counties. Field reports for the 4 element occurrences documented have been sent to The Pennsylvania Natural Heritage Program. The finds included a large population of swamp dog-hobble (*Leucothoe racemosa*) in the Bushkill Creek greenway corridor in Northampton County, a new population of Indian paintbrush (*Castilleja coccinea*) in Bucks County, reconfirmation of a small population of early buttercup (*Ranunculus fascicularis*) in Evansburg State Park in Montgomery County and update of twisted-stalk (*Streptopus amplexifolius*) in Carbon County. Field reports have been submitted to the Pennsylvania Natural Heritage Program.

Environmental Reviews

At the request of Autumn Sabo, we have consulted on several projects that have come up for environmental review because of potential impacts on PNDI-listed plants. Of particular concern is a proposal for development at the old Delhaas High School Property in Bristol Township. This site is adjacent to the Delhaas Woods Preserve in Silver Lake County Park, a hot spot for rare coastal plain species.

Little Tinicum Island Oil Spill Assessment

Ann Rhoads made a visit to Little Tinicum Island with DEP personnel on December 16, 2004 to assess the degree of threat to the fresh water intertidal marsh caused by the Athos I oil spill that occurred in the Delaware River on November 26, 2004 (see full report in Appendix B).

Lake Erie Site Bioblitz

Ann Rhoads and Roger Latham spent a full day participating in a bioblitz at the newly acquired Bureau of State Parks Coho site on the Lake Erie Bluffs. They recorded a total of 168 species (see Appendix C for a complete list).

Discussion of Management Recommendations

An outcome of this year's surveys will be recommendations that *Utricularia inflata* be delisted. Further study of the status of *Schoenoplectus subterminalis* is needed to determine whether its recommended status of PT is still appropriate; we have requested a complete data dump from PNHP in order to make an evaluation.

Literature/Sources Cited

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Rhoads, A. F. and W. M. Klein. 1993. *The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas*. American Philosophical Society, Philadelphia, PA

Rhoads, Ann Fowler, and Timothy A. Block. 2000. *Plants of Pennsylvania: An Illustrated Manual*. University of Pennsylvania Press, Philadelphia, PA

Appendix A.

2004 Lake Survey Herbarium Specimens Deposited at the Morris Arboretum (MOAR) and the Academy of Natural Sciences of Philadelphia (PH)

Scientific name	Family name	Month	Day	Year	County	Location	Herbarium
Alisma subcordatum	Alismataceae	8	17	2004	Wayne	Arlington	MOAR
Penthorum sedoides	Saxifragaceae	8	17	2004	Wayne	Arlington	MOAR
Schoenoplectus purshianus	Cyperaceae	8	10	2004	Luzerne	Bear Creek Junction	MOAR
Schoenoplectus purshianus	Cyperaceae	8	10	2004	Luzerne	Bear Creek Junction	PH
Callitriche heterophylla	Callitrichaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Cornus sericea	Cornaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Isoetes echinospora	Isoetaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Isoetes engelmannii	Isoetaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Isoetes riparia	Isoetaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Juncus brachycephalus	Juncaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Juncus brachycephalus	Juncaceae	8	2	2004	Sullivan	Eagles Mere Lake	PH
Myriophyllum humile	Haloragaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Myriophyllum tenellum	Haloragaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Myriophyllum tenellum	Haloragaceae	8	2	2004	Sullivan	Eagles Mere Lake	PH
Myriophyllum tenellum	Haloragaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Najas flexilis	Najadaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Najas flexilis	Najadaceae	8	2	2004	Sullivan	Eagles Mere Lake	PH
Nuphar variegata	Nymphaeaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	8	2	2004	Sullivan	Eagles Mere Lake	PH
Potamogeton epihydrus	Potamogetonaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Potamogeton epihydrus	Potamogetonaceae	8	2	2004	Sullivan	Eagles Mere Lake	PH
Sparganium americanum	Sparganiaceae	8	2	2004	Sullivan	Eagles Mere Lake	MOAR
Isoetes echinospora	Isoetaceae	8	17	2004	Wayne	Goose Pond	MOAR
Polygonum amphibium var. *emersum*	Polygonaceae	8	17	2004	Wayne	Goose Pond	MOAR
Potamogeton amplifolius	Potamogetonaceae	8	17	2004	Wayne	Goose Pond	MOAR
Sagittaria graminea var. *graminea*	Alismataceae	8	17	2004	Wayne	Goose Pond	MOAR
Ceratophyllum demersum	Ceratophyllaceae	8	26	2004	Pike	Greeley	MOAR
Glyceria grandis	Poaceae	8	26	2004	Pike	Greeley	MOAR
Sparganium eurycarpum	Sparganiaceae	8	2	2004	Sullivan	Hunters Lake	MOAR
Sparganium eurycarpum	Sparganiaceae	8	2	2004	Sullivan	Hunters Lake	MOAR
Brasenia schreberi	Cabombaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Carex comosa	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Carex utriculata	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Carex utriculata	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	7	20	2004	Luzerne	Lake Catalpa	PH
Cyperus strigosus	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Dulichium arundinaceum	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Eleocharis palustris	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Elodea nuttallii	Hydrocharitaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Elodea nuttallii	Hydrocharitaceae	7	20	2004	Luzerne	Lake Catalpa	PH
Hypericum mutilum	Clusiaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Lemna minor	Lemnaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Najas flexilis	Najadaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Nuphar variegata	Nymphaeaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Polygonum hydropiper	Polygonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Polygonum hydropiper	Polygonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Pontederia cordata	Pontederiaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	PH

Potamogeton epihydrus	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Potamogeton pusillus	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	PH
Potamogeton pusillus	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Potamogeton robbinsii	Potamogetonaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Potentilla palustris	Rosaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sagittaria latifolia var. *latifolia*	Alismataceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sagittaria rigida	Alismataceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sagittaria rigida	Alismataceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sagittaria rigida	Alismataceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sagittaria rigida	Alismataceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Schoenoplectus tabernaemontani	Cyperaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sparganium americanum	Sparganiaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Sparganium eurycarpum	Sparganiaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Utricularia gibba	Lentibulariaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Utricularia gibba	Lentibulariaceae	7	20	2004	Luzerne	Lake Catalpa	PH
Vallisneria americana var. *americana*	Hydrocharitaceae	7	20	2004	Luzerne	Lake Catalpa	MOAR
Vallisneria americana var. *americana*	Hydrocharitaceae	7	20	2004	Luzerne	Lake Catalpa	PH
Bartonia virginica	Gentianaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Bidens discoidea	Asteraceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Bidens discoidea	Asteraceae	8	16	2004	Wayne	Lake Lacawac	PH
Eleocharis robbinsii	Cyperaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Eleocharis robbinsii	Cyperaceae	8	16	2004	Wayne	Lake Lacawac	PH
Potamogeton bicupulatus	Potamogetonaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Potamogeton epihydrus	Potamogetonaceae	8	6	2004	Wayne	Lake Lacawac	MOAR
Potentilla palustris	Rosaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Schoenoplectus subterminalis	Cyperaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Sparganium angustifolium	Sparganiaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Utricularia cornuta	Lentibulariaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Vallisneria americana var. *americana*	Hydrocharitaceae	8	16	2004	Wayne	Lake Lacawac	MOAR
Bidens discoidea	Asteraceae	8	6	2004	Pike	Lake Minisink	MOAR
Brasenia schreberi	Cabombaceae	7	23	2004	Pike	Lake Minisink	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	8	6	2004	Pike	Lake Minisink	MOAR
Cicuta bulbifera	Apiaceae	7	23	2004	Pike	Lake Minisink	MOAR
Eleocharis obtusa var. *obtusa*	Cyperaceae	7	23	2004	Pike	Lake Minisink	MOAR
Isoetes echinospora	Isoetaceae	7	23	2004	Pike	Lake Minisink	MOAR
Juncus militaris	Juncaceae	7	23	2004	Pike	Lake Minisink	MOAR
Juncus militaris	Juncaceae	7	23	2004	Pike	Lake Minisink	PH
Najas flexilis	Najadaceae	7	23	2004	Pike	Lake Minisink	MOAR
Najas gracillima	Najadaceae	8	6	2004	Pike	Lake Minisink	MOAR
Nuphar variegata	Nymphaeaceae	7	23	2004	Pike	Lake Minisink	MOAR
Nymphaea odorata	Nymphaeaceae	7	23	2004	Pike	Lake Minisink	MOAR
Nymphoides cordata	Menyanthaceae	7	23	2004	Pike	Lake Minisink	MOAR
Nymphoides cordata	Menyanthaceae	7	23	2004	Pike	Lake Minisink	PH
Orontium aquaticum	Araceae	7	23	2004	Pike	Lake Minisink	MOAR
Pontederia cordata	Pontederiaceae	7	23	2004	Pike	Lake Minisink	MOAR
Potamogeton bicupulatus	Potamogetonaceae	8	6	2004	Pike	Lake Minisink	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	23	2004	Pike	Lake Minisink	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	23	2004	Pike	Lake Minisink	PH
Potamogeton diversifolius	Potamogetonaceae	8	6	2004	Pike	Lake Minisink	MOAR
Potamogeton diversifolius	Potamogetonaceae	8	6	2004	Pike	Lake Minisink	PH
Potamogeton epihydrus	Potamogetonaceae	7	23	2004	Pike	Lake Minisink	MOAR
Potamogeton pusillus	Potamogetonaceae	8	6	2004	Pike	Lake Minisink	MOAR
Potamogeton pusillus	Potamogetonaceae	8	6	2004	Pike	Lake Minisink	PH
Rubus flagellaris	Rosaceae	8	6	2004	Pike	Lake Minisink	MOAR
Rubus hispidus	Rosaceae	8	6	2004	Pike	Lake Minisink	MOAR
Schoenoplectus subterminalis	Cyperaceae	7	23	2004	Pike	Lake Minisink	MOAR
Schoenoplectus subterminalis	Cyperaceae	7	23	2004	Pike	Lake Minisink	MOAR

Spiraea alba	Rosaceae	7	23	2004	Pike	Lake Minisink	MOAR
Utricularia gibba	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	MOAR
Utricularia gibba	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	OH
Utricularia intermedia	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	MOAR
Utricularia intermedia	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	PH
Utricularia macrorhiza	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	MOAR
Utricularia minor	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	MOAR
Utricularia purpurea	Lentibulariaceae	7	23	2004	Pike	Lake Minisink	MOAR
Andromeda polifolia var. *glaucophylla*	Ericaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Andromeda polifolia var. *glaucophylla*	Ericaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Brasenia schreberi	Cabombaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Brasenia schreberi	Cabombaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Callitriche heterophylla	Callitrichaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Callitriche heterophylla	Callitrichaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Callitriche palustris	Callitrichaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Carex comosa	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Drosera rotundifolia	Droseraceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Dulichium arundinaceum	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Eleocharis palustris	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Eleocharis palustris	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Elodea nuttallii	Hydrocharitaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Elodea nuttallii	Hydrocharitaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Eriophorum virginicum	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Juncus acuminatus	Juncaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Najas flexilis	Najadaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Nuphar variegata	Nymphaeaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Nymphaea odorata	Nymphaeaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Polygonum amphibium var. *emersum*	Polygonaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Pontederia cordata	Pontederiaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Pontederia cordata	Pontederiaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Pontederia cordata	Pontederiaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Potamogeton diversifolius	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Potamogeton epihydrus	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Potamogeton pusillus	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Potamogeton pusillus	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Potamogeton pusillus	Potamogetonaceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Rhamnus cathartica	Rhamnaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Sagittaria latifolia var. *latifolia*	Alismataceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Sagittaria latifolia var. *latifolia*	Alismataceae	7	7	2004	Susquehanna	Lake Of Meadows	PH
Sagittaria latifolia var. *latifolia*	Alismataceae	7	8	2004	Susquehanna	Lake Of Meadows	MOAR
Schoenoplectus tabernaemontani	Cyperaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Sparganium americanum	Sparganiaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Thalictrum pubescens	Ranunculaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Toxicodendron vernix	Anacardiaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Vaccinium oxycoccos	Ericaceae	7	7	2004	Susquehanna	Lake Of Meadows	MOAR
Acer spicatum	Aceraceae	7	15	2004	Pike	Lake Paupack	MOAR
Andromeda polifolia var. *glaucophylla*	Ericaceae	7	15	2004	Pike	Lake Paupack	MOAR
Asplenium trichomanes	Aspleniaceae	7	15	2004	Pike	Lake Paupack	MOAR
Brasenia schreberi	Cabombaceae	7	14	2004	Pike	Lake Paupack	MOAR
Callitriche heterophylla	Callitrichaceae	7	14	2004	Pike	Lake Paupack	MOAR
Callitriche heterophylla	Callitrichaceae	7	14	2004	Pike	Lake Paupack	PH
Callitriche heterophylla	Callitrichaceae	7	14	2004	Pike	Lake Paupack	MOAR
Carex utriculata	Cyperaceae	7	14	2004	Pike	Lake Paupack	MOAR
Carex utriculata	Cyperaceae	7	14	2004	Pike	Lake Paupack	MOAR

Ceratophyllum muricatum	Ceratophyllaceae	7	14	2004	Pike	Lake Paupack	MOAR
Circaea alpina	Onagraceae	7	15	2004	Pike	Lake Paupack	MOAR
Cystopteris fragilis	Dryopteridaceae	7	15	2004	Pike	Lake Paupack	MOAR
Digitalis lutea	Scrophulariaceae	7	15	2004	Pike	Lake Paupack	MOAR
Digitalis lutea	Scrophulariaceae	7	15	2004	Pike	Lake Paupack	MOAR
Dulichium arundinaceum	Cyperaceae	7	14	2004	Pike	Lake Paupack	MOAR
Elatine minima	Elatinaceae	7	14	2004	Pike	Lake Paupack	MOAR
Elatine triandra	Elatinaceae	7	14	2004	Pike	Lake Paupack	MOAR
Eleocharis acicularis	Cyperaceae	7	14	2004	Pike	Lake Paupack	MOAR
Elodea nuttallii	Hydrocharitaceae	7	14	2004	Pike	Lake Paupack	MOAR
Elodea nuttallii	Hydrocharitaceae	7	14	2004	Pike	Lake Paupack	PH
Equisetum fluviatile	Equisetaceae	7	14	2004	Pike	Lake Paupack	MOAR
Eriophorum virginicum	Cyperaceae	7	15	2004	Pike	Lake Paupack	MOAR
Hypericum ellipticum	Clusiaceae	7	15	2004	Pike	Lake Paupack	MOAR
Hypericum ellipticum	Clusiaceae	7	15	2004	Pike	Lake Paupack	MOAR
Isoetes echinospora	Isoetaceae	7	14	2004	Pike	Lake Paupack	MOAR
Isoetes echinospora	Isoetaceae	7	14	2004	Pike	Lake Paupack	PH
Kalmia polifolia	Ericaceae	7	15	2004	Pike	Lake Paupack	MOAR
Laportea canadensis	Urticaceae	7	15	2004	Pike	Lake Paupack	MOAR
Lysimachia terrestris	Primulaceae	7	15	2004	Pike	Lake Paupack	MOAR
Najas flexilis	Najadaceae	7	14	2004	Pike	Lake Paupack	MOAR
Nuphar variegata	Nymphaeaceae	7	14	2004	Pike	Lake Paupack	MOAR
Nymphaea odorata	Nymphaeaceae	7	14	2004	Pike	Lake Paupack	MOAR
Nymphaea odorata	Nymphaeaceae	7	14	2004	Pike	Lake Paupack	PH
Picea mariana	Pinaceae	7	15	2004	Pike	Lake Paupack	MOAR
Polypodium appalachianum	Polypodiaceae	7	15	2004	Pike	Lake Paupack	MOAR
Pontederia cordata	Pontederiaceae	7	14	2004	Pike	Lake Paupack	MOAR
Pontederia cordata	Pontederiaceae	7	14	2004	Pike	Lake Paupack	MOAR
Potamogeton crispus	Potamogetonaceae	7	14	2004	Pike	Lake Paupack	MOAR
Potamogeton epihydrus	Potamogetonaceae	7	14	2004	Pike	Lake Paupack	MOAR
Potamogeton pusillus	Potamogetonaceae	7	14	2004	Pike	Lake Paupack	MOAR
Potamogeton pusillus	Potamogetonaceae	7	14	2004	Pike	Lake Paupack	PH
Rhododendron viscosum	Ericaceae	7	15	2004	Pike	Lake Paupack	MOAR
Rubus pensilvanicus	Rosaceae	7	15	2004	Pike	Lake Paupack	MOAR
Sagittaria latifolia var. *latifolia*	Alismataceae	7	14	2004	Pike	Lake Paupack	MOAR
Sium suave	Apiaceae	7	14	2004	Pike	Lake Paupack	MOAR
Sparganium americanum	Sparganiaceae	7	14	2004	Pike	Lake Paupack	MOAR
Utricularia gibba	Lentibulariaceae	7	14	2004	Pike	Lake Paupack	MOAR
Utricularia gibba	Lentibulariaceae	7	14	2004	Pike	Lake Paupack	PH
Utricularia macrorhiza	Lentibulariaceae	7	14	2004	Pike	Lake Paupack	MOAR
Vallisneria americana var. *americana*	Hydrocharitaceae	7	15	2004	Pike	Lake Paupack	MOAR
Woodwardia virginica	Blechnaceae	7	15	2004	Pike	Lake Paupack	MOAR
Brasenia schreberi	Cabombaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Elatine minima	Elatinaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Isoetes echinospora	Isoetaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Isoetes engelmannii	Isoetaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Najas gracillima	Najadaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Nuphar variegata	Nymphaeaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Nuphar variegata	Nymphaeaceae	6	30	2004	Pike	Log Tavern Pond	PH
Nymphaea odorata	Nymphaeaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Potamogeton epihydrus	Potamogetonaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Potamogeton pusillus	Potamogetonaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Schoenoplectus subterminalis	Cyperaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Schoenoplectus subterminalis	Cyperaceae	6	30	2004	Pike	Log Tavern Pond	PH
Utricularia cornuta	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Utricularia cornuta	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	PH
Utricularia gibba	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	MOAR

Utricularia inflata	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Utricularia purpurea	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	MOAR
Utricularia purpurea	Lentibulariaceae	6	30	2004	Pike	Log Tavern Pond	PH
Brasenia schreberi	Cabombaceae	7	29	2004	Pike	Marcel Lake	MOAR
Calla palustris	Araceae	7	29	2004	Pike	Marcel Lake	MOAR
Calla palustris	Araceae	7	29	2004	Pike	Marcel Lake	MOAR
Callitriche heterophylla	Callitrichaceae	7	29	2004	Pike	Marcel Lake	MOAR
Callitriche heterophylla	Callitrichaceae	7	29	2004	Pike	Marcel Lake	PH
Ceratophyllum muricatum	Ceratophyllaceae	7	29	2004	Pike	Marcel Lake	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	7	29	2004	Pike	Marcel Lake	MOAR
Elatine triandra	Elatinaceae	7	29	2004	Pike	Marcel Lake	MOAR
Elatine triandra	Elatinaceae	7	29	2004	Pike	Marcel Lake	PH
Eleocharis acicularis	Cyperaceae	7	29	2004	Pike	Marcel Lake	MOAR
Elodea nuttallii	Hydrocharitaceae	7	29	2004	Pike	Marcel Lake	MOAR
Myriophyllum humile	Haloragaceae	7	29	2004	Pike	Marcel Lake	MOAR
Myriophyllum humile	Haloragaceae	7	29	2004	Pike	Marcel Lake	PH
Myriophyllum humile	Haloragaceae	7	29	2004	Pike	Marcel Lake	MOAR
Najas flexilis	Najadaceae	7	29	2004	Pike	Marcel Lake	MOAR
Nuphar variegata	Nymphaeaceae	7	29	2004	Pike	Marcel Lake	MOAR
Nuphar variegata	Nymphaeaceae	7	29	2004	Pike	Marcel Lake	PH
Nuphar variegata	Nymphaeaceae	7	29	2004	Pike	Marcel Lake	MOAR
Nymphaea odorata	Nymphaeaceae	7	29	2004	Pike	Marcel Lake	MOAR
Nymphaea odorata	Nymphaeaceae	7	29	2004	Pike	Marcel Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	29	2004	Pike	Marcel Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	29	2004	Pike	Marcel Lake	PH
Potamogeton diversifolius	Potamogetonaceae	7	29	2004	Pike	Marcel Lake	MOAR
Potamogeton epihydrus	Potamogetonaceae	7	29	2004	Pike	Marcel Lake	MOAR
Potamogeton epihydrus	Potamogetonaceae	7	29	2004	Pike	Marcel Lake	PH
Sparganium americanum	Sparganiaceae	7	29	2004	Pike	Marcel Lake	MOAR
Spirodela polyrhiza	Lemnaceae	7	29	2004	Pike	Marcel Lake	MOAR
Utricularia macrorhiza	Lentibulariaceae	7	29	2004	Pike	Marcel Lake	MOAR
Calamagrostis cinnoides	Poaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Drosera intermedia	Droseraceae	8	10	2004	Luzerne	Mud Pond	MOAR
Dulichium arundinaceum	Cyperaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Glyceria canadensis	Poaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Hypericum canadense	Clusiaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Juncus brevicaudatus	Juncaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Juncus pelocarpus	Juncaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Menyanthes trifoliata	Menyanthaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Nuphar variegata	Nymphaeaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Nymphaea odorata	Nymphaeaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Potamogeton pusillus	Potamogetonaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Schoenoplectus subterminalis	Cyperaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Schoenoplectus subterminalis	Cyperaceae	8	10	2004	Luzerne	Mud Pond	PH
Utricularia macrorhiza	Lentibulariaceae	8	10	2004	Luzerne	Mud Pond	MOAR
Brasenia schreberi	Cabombaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Hypericum mutilum	Clusiaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Myriophyllum humile	Haloragaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Nuphar variegata	Nymphaeaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Potamogeton natans	Potamogetonaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Rhynchospora capitellata	Cyperaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Torreyochloa pallida var. *fernaldii*	Poaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Utricularia inflata	Lentibulariaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Utricularia purpurea	Lentibulariaceae	8	10	2004	Luzerne	Ochre Mill	MOAR
Apios americana	Fabaceae	7	29	2004	Pike	Pecks Pond	MOAR
Apios americana	Fabaceae	7	29	2004	Pike	Pecks Pond	PH
Cephalanthus occidentalis	Rubiaceae	7	29	2004	Pike	Pecks Pond	MOAR

Decodon verticillatus	Lythraceae	7	29	2004	Pike	Pecks Pond	MOAR
Decodon verticillatus	Lythraceae	7	29	2004	Pike	Pecks Pond	MOAR
Spiraea alba	Rosaceae	7	29	2004	Pike	Pecks Pond	MOAR
Gentiana linearis	Gentianaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Hypericum canadense	Clusiaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Juncus brevicaudatus	Juncaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Myriophyllum humile	Haloragaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Oclemena acuminata	Asteraceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Polygala sanguinea	Polygalaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Utricularia geminiscapa	Lentibulariaceae	8	10	2004	Luzerne	Pleasant View Summit	MOAR
Nuphar variegata	Nymphaeaceae	6	9	2004	Northampton	Rismiller	MOAR
Nuphar variegata	Nymphaeaceae	6	9	2004	Northampton	Rismiller	MOAR
Callitriche stagnalis	Callitrichaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Dulichium arundinaceum	Cyperaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Dulichium arundinaceum	Cyperaceae	7	26	2004	Susquehanna	Silver Lake	PH
Elatine triandra	Elatinaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Elatine triandra	Elatinaceae	7	26	2004	Susquehanna	Silver Lake	PH
Eleocharis acicularis	Cyperaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Eleocharis palustris	Cyperaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Eleocharis palustris	Cyperaceae	7	26	2004	Susquehanna	Silver Lake	PH
Elodea nuttallii	Hydrocharitaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Elodea nuttallii	Hydrocharitaceae	7	26	2004	Susquehanna	Silver Lake	PH
Isoetes echinospora	Isoetaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Isoetes engelmannii	Isoetaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Isoetes engelmannii	Isoetaceae	7	26	2004	Susquehanna	Silver Lake	PH
Najas flexilis	Najadaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Najas flexilis	Najadaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Nuphar variegata	Nymphaeaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Nymphaea odorata	Nymphaeaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Nymphaea odorata	Nymphaeaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Nymphaea odorata	Nymphaeaceae	7	26	2004	Susquehanna	Silver Lake	PH
Pontederia cordata	Pontederiaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton epihydrus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton pusillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	PH
Potamogeton pusillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton pusillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton pusillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	PH
Potamogeton robbinsii	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton robbinsii	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	PH
Potamogeton spirillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton spirillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	PH
Potamogeton spirillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton spirillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Potamogeton spirillus	Potamogetonaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Sagittaria rigida	Alismataceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Sagittaria rigida	Alismataceae	7	26	2004	Susquehanna	Silver Lake	PH
Sparganium americanum	Sparganiaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Sparganium americanum	Sparganiaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Vallisneria americana var. *americana*	Hydrocharitaceae	7	26	2004	Susquehanna	Silver Lake	MOAR
Chaerophyllum procumbens	Apiaceae	5	21	2004	Montgomery	Skippack	MOAR
Andromeda polifolia var. *glaucophylla*	Ericaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Calla palustris	Araceae	7	6	2004	Wayne	Spruce Lake	MOAR
Carex echinata	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Carex emoryi	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Carex emoryi	Cyperaceae	7	6	2004	Wayne	Spruce Lake	PH
Carex lasiocarpa var. *americana*	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Carex lasiocarpa var. *americana*	Cyperaceae	7	6	2004	Wayne	Spruce Lake	PH

Carex lasiocarpa var. *americana*	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Ceratophyllum muricatum	Ceratophyllaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Cladium mariscoides	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Cladium mariscoides	Cyperaceae	7	6	2004	Wayne	Spruce Lake	PH
Dulichium arundinaceum	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Elatine minima	Elatinaceae	7	6	2004	Wayne	Spruce Lake	PH
Elatine minima	Elatinaceae	7	6	2004	Wayne	Spruce Lake	PH
Eleocharis acicularis	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Eleocharis acicularis	Cyperaceae	7	6	2004	Wayne	Spruce Lake	PH
Eleocharis palustris	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Elodea canadensis	Hydrocharitaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Equisetum fluviatile	Equisetaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Eriocaulon aquaticum	Eriocaulaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Eriophorum virginicum	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Galium tinctorium	Rubiaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Glyceria borealis	Poaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Glyceria borealis	Poaceae	7	6	2004	Wayne	Spruce Lake	PH
Hypericum boreale	Clusiaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Hypericum boreale	Clusiaceae	7	6	2004	Wayne	Spruce Lake	PH
Hypericum ellipticum	Clusiaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Isoetes echinospora	Isoetaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Menyanthes trifoliata	Menyanthaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Myriophyllum humile	Haloragaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Najas flexilis	Najadaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Nuphar variegata	Nymphaeaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Pogonia ophioglossoides	Orchidaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potamogeton diversifolius	Potamogetonaceae	7	6	2004	Wayne	Spruce Lake	PH
Potamogeton pusillus	Potamogetonaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potamogeton pusillus	Potamogetonaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potamogeton robbinsii	Potamogetonaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potentilla palustris	Rosaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Potentilla palustris	Rosaceae	7	6	2004	Wayne	Spruce Lake	PH
Rubus hispidus	Rosaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Schoenoplectus tabernaemontani	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Scirpus atrocinctus	Cyperaceae	7	6	2004	Wayne	Spruce Lake	PH
Scirpus atrocinctus	Cyperaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Sparganium americanum	Sparganiaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Sparganium americanum	Sparganiaceae	7	6	2004	Wayne	Spruce Lake	PH
Utricularia macrorhiza	Lentibulariaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Vaccinium macrocarpon	Ericaceae	7	6	2004	Wayne	Spruce Lake	MOAR
Utricularia inflata	Lentibulariaceae	10	13	2004	Luzerne	Tannery	MOAR

Appendix B.

Report to the Pennsylvania Bureau of Forestry On a Visit to Inspect Oil Damage to Tidal Marshes of Little Tinicum Island From the Athos I Oil Spill of November 26, 2004

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100 Northwestern Ave., Philadelphia, PA 19118

On December 16, 2004 I visited Little Tinicum Island in the Delaware River in Delaware County, PA with Paul Jardel and Thomas L. Magge of the Pennsylvania Department of Environmental Protection. Our visit was timed to coincide with low tide. We walked the entire north side of Little Tinicum Island inspecting the shoreline and the exposed tidal mud flats and lagoons.

Tidal Mud Flats

We saw very little oil on the surface of the tidal flats; however, anything that protruded from the surface had oil on it, including debris and plants.

Dormant leaves of* spatterdock *with black coating of oil visible

Plants that were visible on the tidal flats included dormant leaves of spatterdock (*Nuphar advena*), sweetflag (*Acorus calamus*), arrowhead (*Sagittaria rigida*), arrow-arum (*Peltandra virginica*), and dwarf spike-rush (*Eleocharis parvula*). Black deposits of oil were visible on the leaves of many, but not all, of these plants. We did see a few small (6 inch diameter or less) patches of oil on the mud and an occasional area with oil sheen on the water; but for the most part the surface of the tidal flat appeared to be free of oil. There was no evidence that the oil had penetrated into the sediments on the mud flats.

Arrowhead leaves with an oily coating

My assessment is that the oil-coated leaves will almost certainly die, but the rhizomes of the plants mentioned above, all of which are perennials, will be unaffected; and that normal growth will resume in the spring. Other perennial species that were not visible at this time but are known to be present, including strap-leaf arrowhead (*Sagittaria subulata*), Smith's bulrush (*Scirpus smithii*), and mud-plantain (*Heteranthera multiflora*) should also be unaffected. The seeds of tidal flat annuals,

including long-lobed arrowhead (*Sagittaria calycina* var. *spongiosa*) and spike-rush (*Eleocharis obtusa* var. *peasii*), should also be unaffected.

ATVs and other vehicles and heavy foot traffic should not be allowed on the tidal flats, as the rhizomes of some of these plants are slender and fragile.

High Tide Line

Deposits of oil were present on vegetation, rocks, debris, and the sand along the high tide line; the intensity of the deposit varied depending on the exposure of each section of shoreline. Those areas most open to the east (upstream direction) were the most severely affected. Thick black oil coated the lower 1-3 feet of dead stems of common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), swamp-mallow (*Hibiscus moschuetos*), and smartweed (*Polygonum* sp.). Stems and exposed roots of woody plants, including shrubs such as arrow-wood (*Viburnum dentatum*), groundsel-tree (*Baccharis halimifolia*), black elderberry (*Sambucus canadensis*), false indigo (*Amorpha fruticosa*), and trees also were coated to a height of about 12 inches at the base.

In a few areas near the east (upstream) end of the island, oil had soaked in to the sand and gravel surface just below the high tide line forming an asphalt-like crust.

Oil coating the lower portions of purple loosestrife and smartweed at the high tide line

I recommended that dead stems of the herbaceous species be cut as close to the base as possible and removed from the site to prevent the oil on them from being redistributed. Woody stems of shrubs may be girdled and killed by the oil, due to the toxicity of the oil to the cambium layer just below the bark; however, the bark of older stems may be thick enough to protect them. Whether the stems are cut or left in place, regrowth will likely occur from dormant buds at the base or from stolons. Similarly, exposed roots and lower stems of trees that are coated with oil may be girdled, or they may escape damage depending on the thickness of the bark. It is probably best to leave these roots and stems in place.

Several rare tidal marsh plants typically grow at or near the high tide line, wild rice (*Zizania aquatica*), waterhemp ragweed (*Amaranthus cannabinus*), Walter's barnyard grass (*Echinochloa walteri*), swamp-beggar-ticks (*Bidens bidentoides*), and marsh fleabane (*Pluchea odorata*), are all annuals and not visible at this time. Because they over-winter as seeds, they will likely escape direct impact from the oil.

Water-horehound (*Lycopus rubellus*), an herbaceous perennial that often grows right at the high tide line, may be vulnerable to damage from the oil. It frequently grows in crevices among the roots of trees right at the uppermost reach of the tide. Its over-wintering structures are stolons and tubers.

Interior Areas

In order to move people and materials from one side of the island to the other clean-up contractors have blazed several ATV trails through the island interior. These disturbances should not cause any permanent harm.

List of PNHP-classified plants known to occur at Little Tinicum Island

common name	scientific name	growth cycle	status
waterhemp ragweed	*Amaranthus cannabinus*	annual	PR
swamp beggar-ticks	*Bidens bidentoides*	annual	PT/PE
Walter's barnyard grass	*Echinochloa walteri*	annual	PE
spike-rush	*Eleocharis obtusa* var. *peasii*	annual	PE
dwarf spike-rush	*Eleocharis parvula*	perennial	PE
mud-plantain	*Heteranthera multiflora*	perennial	PE
water-horehound	*Lycopus rubellus*	perennial	
marsh fleabane	*Pluchea odorata*	annual	TU/PE
long-lobed arrowhead	*Sagittaria calycina* var. *spongiosa*	annual	PE
strap-leaf arrowhead	*Sagittaria subulata*	perennial	PR
Smith's bulrush	*Scirpus smithii*	perennial	PE
wild-rice	*Zizania aquatica*	annual	PR

Appendix C.

Coho site, 1-1.5 km NW of Girard Junction, Erie County, May 14, 2004

Species identified by Ann Rhoads and Roger Latham

scientific name	old dune ridge	upland forest	ravine	lake shore slumps	wetlands	comments	specimen
Acer rubrum	x	x	x		x		
Acer saccharum	x	x	x				
Achillea millefolium			x				
Actaea pachypoda			x				
Alliaria petiolata	x	x					
Allium tricoccum		x					
Alnus incana ssp. *rugosa*				x			
Amelanchier laevis	x						
Antennaria sp.	x						
Anthoxanthum odoratum	x						
Arabidopsis thaliana	x						
Arabis laevigata			x			upper slopes	T
Arabis lyrata		x					T
Aralia nudicaulis		x	x				
Arisaema triphyllum		x	x		x		
Asarum canadense			x				
Barbarea verna		x					
Berberis thunbergii		x					
Betula allegheniensis		x	x				
Botrychium virginiana			x				
Cardamine concatenata		x	x				T
Cardamine diphylla			x				T
Cardamine douglassii		x			x		T
Cardamine hirsuta		x					
Cardamine pensylvanica					x		
Cardamine x ????			x				T
Carex brunescens							T
Carex gracillima		x					
Carex laxiflora			x				T
Carex leptonervia		x					T
Carex plantaginea			x				T
Carex prasina			x		x		
Carex scabrata					x		T
Carya cordiformis		x					
Castanea dentata		x					
Caulophyllum thalictroides		x					
Celastrus orbiculatus	x						
Centaurea maculosa	x						
Cerastium nutans		x					T
Chelone glabra			x		x		
Chimaphila maculata	x						

Chrysosplenium americanum			x		x		
Cimicifuga racemosa		x					
Circaea lutetiana			x				
Collinsonia canadensis			x				
Cornus alternifolia			x				
Cornus sericea				x			T
Corylus americana		x					T
Dactylis glomerata	x					few	
Danthonia sp.	x						
Deparia acrostichoides			x				
Dicentra cucullata		x					
Dirca palustris		x	x				T
Disporum lanuginosa			x				
Dryopteris marginalis		x	x				
Dryoptreris carthusiana		x	x				
Equisetum arvense			x	x			
Equisetum hyemale			x				
Erythronium americanum			x				
Euonymus obovatus		x					T
Eurybia divaricata		x	x				
Fagus grandifolia	x	x	x				
Floerkia proserpinacoides		x					T
Fragaria virginiana	x						T
Fraxinus americana	x	x	x				
Fraxinus pensylvanica					x		
Galium aparine	x	x					
Galium triflorum			x				
Geranium maculatum		x					
Geum sp.		x					
Hamamelis virginiana		x	x				
Hepatica nobilis var. acuta			x				
Hesperis matronalis		x					
Hieracium sp.	x						
Hydrophyllum virginiana		x					
Impatiens sp.		x	x		x		
Juncus effusus		x					
Laportea canadensis			x				
Lespedeza sp.	x						
Ligustrum obtusifolium		x					
Lindera benzoin			x				
Liriodendron tulipifera		x					
Lonicera canadensis			x				T
Lonicera dioica		x					
Lonicera morrowii	x	x					T
Lonicera x bella	x						T
Lycopodium dendroideum		x					T
Lycopodium obscurum		x	x				T
Lysimachia ciliata		x	x		x		

Lysimachia numularia		x					
Maianthemum canadense	x	x	x				
Malus coronaria	x						T
Mitchella repens			x				
Mitella diphylla			x				
Nyssa sylvatica	x					few	
Onoclea sensibilis		x			x		
Osmorhiza claytonii			x				
Osmunda cinnamomea			x		x		
Panax trifoliata		x					
Panicum laxiflorum	x						
Parthenocissus quinquefolium		x					
Phegopteris hexagonoptera			x				
Phlox divaricata		x					
Phragmites australis				x			T
Phytolacca americana		x				along woods road	
Poa alsodes		x					T
Poa compressa	x						
Poa sylvestris		x					T
Podophyllum peltatum		x					
Polygonatum pubescens		x	x				
Polygonum virginianum		x					
Populus tremuloides				x			
Prenanthes sp.			x				
Prunus pensylvanica	x						
Prunus serotina	x						
Prunus virginiana	x	x					
Quercus alba	x					one small one	
Quercus rubra		x					
Quercus velutina	x						
Ranunculus abortivus			x				
Ranunculus recurvatus			x				
Rhus typhina	x						
Ribes americana		x					T
Rosa multiflora	x	x					
Rubus idaeus		x					
Rubus odoratus				x			
Rubus pensilvanicus				x			T
Rubus recurvicaulis???	x					dominant shrub in oak savanna	T
Rubus setosus		x				disturbed forest opening	T
Rumex acetosella	x						
Rumex obtusifolius		x				along woods road	
Salix eriocephala				x			T
Sambucus racemosa		x					
Sanguinaria canadensis		x	x				
Saxifraga virginiensis			x				

Schizachyrium scoparium	x						
Smilacina racemosa		x	x				
Solidago caesia	x						
Solidago flexicaulis			x				
Sorbus acuparia	x						T
Symplocarpus foetidus			x		x		
Thalictrum dioicum			x				
Thelypteris noveboracensis		x					
Tiarella cordifolia			x				
Tilia americana			x				
Toxicodendron radicans		x					
Trillium erectum		x	x				
Trillium grandiflorum			x				
Tsuga canadensis		x	x				
Tussilago farfara				x			
unknown Caryophyllaceae	x						
Veratrum viride			x		x		
Veronica arvensis							
Veronica officinalis	x						
Viburnum acerifolium		x					
Viburnum dentatum	x						
Viburnum lantanoides			x			few	
Viburnum recognitum					x		T
Viola arvensis						cultivated field	T
Viola blanda			x				T
Viola canadensis		x					
Viola pubescens		x					T
Viola sororia		x					
Vitis sp.		x					T
Vitis sp.	x						